
THE WORLD WAR II ORDNANCE DEPARTMENT'S GOVERNMENT-OWNED CONTRACTOR-OPERATED (GOCO) INDUSTRIAL FACILITIES: KANSAS ARMY AMMUNITION PLANT HISTORIC INVESTIGATION

by
Steve Gaither

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REPORT OF INVESTIGATIONS
NUMBER 5A



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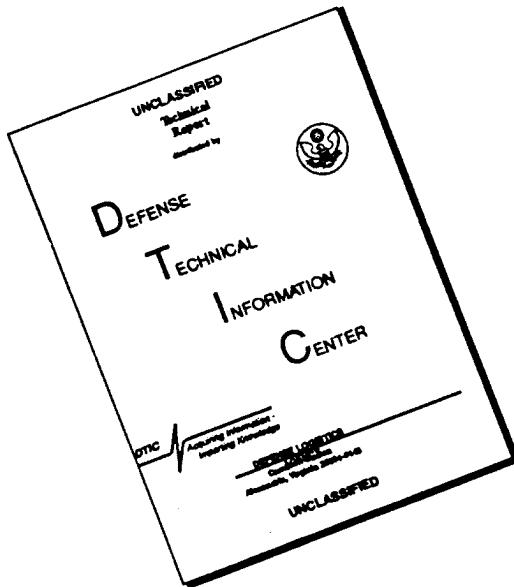


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This report demonstrates that KAAP was a unique facility in the Ordnance Department's GOCO industrial program designed to provide munitions and materiel for European and American forces during World War II. The facility was the first in the program to be funded by Congress and was an important producer throughout the war. It was perhaps the only one of the 77 GOCO facilities to have come in under budget on construction. Throughout the war, KAAP was an important producer of bombs, shells, and components. Engineers and other employees at the facility contributed to the technological advancement of munitions production by designing and developing the first core melt machine, which, in conjunction with the volumetric melt-pour equipment developed elsewhere, greatly aided the war industrial effort by reducing labor requirements and increasing production of shells and bombs.				
In addition to the history of the facility itself, this report discusses the direct and indirect effects construction and operations had on the town of Parsons, Kansas, in particular and Linn County in general, in which Parsons and the facility were and still are located. Although the sudden increase in population, especially during construction, inundated small towns on the perimeter of other World War II munitions facilities, Parsons suffered less because it already had a fairly adequate municipal infrastructure, and because the population influx was spread over quite a large area of southeastern Kansas. Other towns in the region were also large enough and developed enough that they fared well against the changes brought by their position on the industrial front. With the close of World War II, there was some decrease in employment but little decrease in population. Some local residents went back to farming, more into the small businesses and industries of the area. As much as 75 percent of the work force was made up of women, many of whom returned to the home, displaced by the men returning from overseas who were preferentially hired in the post-war times of lower labor demands.				
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**THE WORLD WAR II ORDNANCE DEPARTMENT'S
GOVERNMENT-OWNED CONTRACTOR-OPERATED
(GOCO) INDUSTRIAL FACILITIES:**

**KANSAS ARMY AMMUNITION PLANT
HISTORIC INVESTIGATION**

by
Steve Gaither

Principal Investigator
Duane E. Peter

under
U.S. ARMY CORPS OF ENGINEERS
Fort Worth District
Contract No. DACA63-93-D-0014

U.S. ARMY MATERIAL COMMAND HISTORIC CONTEXT SERIES
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MANAGEMENT SUMMARY

This report presents the results of an examination of the historical records related to the construction and operations of the Kansas Army Ammunition Plant (KAAP), Parsons, Kansas. This research was conducted by Geo-Marine, Inc. (GMI), during February, March, and April 1995. Duane Peter, Senior Archeologist of GMI, served as the Principal Investigator. Steve Gaither, Assistant Archivist/Historian under Kimberly L. Kane, Archivist and Ethnologist/Historian, conducted the archival research. The historical context was developed through thorough research into the archives at KAAP, local libraries, and museums, and was augmented with a series of oral history interviews.

This report demonstrates that KAAP was an important facility in Ordnance Department's government-owned contractor-operated (GOCO) industrial program designed to provide munitions and materiel for European and American forces during World War II. It was perhaps the only one of the 77 GOCO facilities to have come in under budget on construction. Throughout the war, KAAP was an important producer of bombs, shells, and components. Engineers and other employees at the facility contributed to the technological advancement of munitions production by designing and developing the first core melt machine, which, in conjunction with the volumetric melt-pour equipment developed elsewhere, greatly aided the war industrial effort by reducing labor requirements and increasing production of shells and bombs.

In addition to the history of the facility itself, this report discusses the direct and indirect effects construction and operations had on the town of Parsons, Kansas, in particular and Labette County in general, in which Parsons and the facility were and still are located. Although the sudden increase in population, especially during construction, inundated small towns on the perimeter of other World War II munitions facilities, Parsons suffered less because it already had a fairly adequate municipal infrastructure, and because the population influx was spread over quite a large area of southeastern Kansas. Other towns in the region were also large enough and developed enough that they fared well against the changes brought by their position on the industrial front. With the close of World War II, there was some decrease in employment but little decrease in population. Some local residents went back to farming, more into the small businesses and industries of the area. As much as 75 percent of the work force was made up of women, many of whom returned to the home, displaced by the men returning from overseas who were preferentially hired in the post-war times of lower labor demands.

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We would like to thank Joseph Murphey of the U.S. Army Corps of Engineers, Fort Worth District, who was most supportive of our efforts. He provided constructive criticism and management direction throughout this project. In the Geo-Marine, Inc., office in Plano, the final editing and overall production of the report were the responsibilities of Sharlene Allday. Denise Pemberton generated the computerized format for the layout and design of the book.

CHAPTER 1

INTRODUCTION

This report presents the results of research into the historical record of the Kansas Army Ammunition Plant, Parsons, Kansas, 1941-1989. The purpose of this report was to partially fulfill the goals of a larger project that entails not only this specific historic investigation, but also a national context for the World War II Ordnance Department's Government-Owned Contractor-Operated (GOCO) industrial facilities, 1939-1945 (Kane 1995); detailed investigations into the history of seven former World War II-era Ordnance Department GOCO industrial facilities (present-day Badger, Joliet, Indiana, Kansas, Radford, Ravenna, and Twin Cities army ammunition plants); and photographic documentation of the same sample installations. Goals of the larger project included investigation and documentation of World War II and pre-World War II buildings and structures now under the jurisdiction of Army Materiel Command (AMC) as part of a Legacy Resource demonstration program of assistance to small installations, as well as the completion of mitigation efforts stipulated in a 1993 Programmatic Agreement among the AMC, the Advisory Council on Historic Preservation, and multiple State Historic Preservation Officers concerning a program to cease maintenance, excess, and dispose of particular properties. The detailed historic investigation of the Kansas Army Ammunition Plant, like the detailed historic investigations for the other sample installations, was undertaken in order to develop the national historic context on a state and local level. The major focus is upon the impacts of the facility on state and local history.

In September 1993, Geo-Marine, Inc. (GMI), was contracted by the Army Corps of Engineers, Fort Worth District, to complete the national historic context, detailed historic investigations, and photographic documentation. The research for the Kansas Army Ammunition Plant detailed historic investigation was conducted by GMI during February, March, and April 1995. Duane Peter, Director of the Cultural Resources Division at GMI, served as Principal Investigator. Steve Gaither, Assistant Archivist/Historian under Kimberly L. Kane, Archivist and Ethnologist/Historian, conducted the research. The work was performed under Delivery Order No. 014 of Contract No. DACA63-93-D-0014.

Chapter 2 of this report describes the objectives of and the methods used in the detailed historic investigations. The historic context (Chapter 3) is divided into several primary sections. The first includes a discussion of the military and political setting¹ and a detailed description of the construction and World War II-era operations of the facility, originally known as the Kansas Ordnance Plant (KOP). Brief histories of firms associated with the design, construction, and the operation of the facility are included. The discussion

¹ This section draws heavily from Kane (1994), which should be referenced for a more comprehensive discussion of the national setting.

of the technology in use at the facility is important since the core melt equipment setup, an important World War II invention, was developed at KOP. The remaining sections of Chapter 3 discuss the impact the construction and operation of KOP had on the surrounding communities, primarily Parsons, located a few miles northwest of the Administration Area and main entrance. The impact of the facility in this area was mitigated first because Parsons already had the infrastructure in place to handle the population increase without too much strain, second because the people who came to work on construction or in operations settled over a broad area rather than in the immediate vicinity of Parsons, and third because other industries in the area had prepared the way for greater industrial development and helped absorb excess workers at the end of construction and again at the end of operations. Also discussed are the reactions of the local population to the facility and the changes it brought to the region.

CHAPTER 2

OBJECTIVES AND METHODS

OBJECTIVES

The research effort at KAAP was undertaken to partially fulfill objectives of a larger project, the goals of which are to “research and document World War II and earlier buildings and structures at number of ammunition plants under the jurisdiction of the Army Materiel Command (AMC) as a Legacy Resource Program demonstration project for assistance to small installations” and to “fulfill mitigation efforts of a 1993 Programmatic Agreement among the AMC, the Advisory Council on Historic Preservation, and Multiple State Historic Preservation Officers concerning a program to cease maintenance, excess, and dispose of certain properties” (Scope of Work [SOW] 1993:1). The SOW further sets forth the primary goal of investigations into individual facilities, including KAAP, that goal being to “provide [an] understanding of the World War II military-industrial complex through detailed examination of the sample installations [KAAP is one of seven], expanding the national historical context.” The SOW also stated that the investigation was to focus “on World War II social issues of state and local significance, . . . [including] 1.) Controversies over Government acquisition of the land, 2.) How the change in the labor base affected of the [sic] local areas, 3.) Impacts women and blacks had in the local work force, etc.” (SOW 1993:4).

METHODS AND SOURCES

Standard bibliographies of military history, engineering, and the applied sciences, as well as the bibliographies of other relevant reports, were consulted to identify published sources of information germane to the research conducted for this project. Unpublished sources were identified through research at the Suitland Reference Branch of the National Archives and Records Administration; at the Command Historical Office of the U.S. Army Armament, Munitions and Chemical Command (AMCCOM) at Rock Island Arsenal, Rock Island, Illinois; and at the KAAP.

KAAP was the primary focus of the research. Both published and unpublished sources of information dealing with the history and technology of the facility involved research at the Parsons Public Library, Parsons Historical Museum, Parsons Police Department, the Parsons Chamber of Commerce, and the Parsons Superintendent of Schools, all in Parsons, Kansas; the Oswego Public Library and the Oswego Historical

Museum, both in Oswego², Kansas; and the archives located at KAAP³. Several other libraries and archives which were thought could possibly contain material relevant to this project were also contacted, including the Government Documents and Kansas Collection sections of the University of Kansas, Lawrence, Kansas; the Kansas State Historical Society, Topeka, Kansas; the offices of the *Parsons Sun*, and the Labette County Community College, both in Parsons, Kansas; Manville Corporation, Denver, Colorado; Peter Kiewit Sons' Inc.⁴, Omaha, Nebraska; Paschen Contractors, Inc., and Consoer, Townsend & Associates, both of Chicago, Illinois; and the National Agriculture Library, Beltsville, Maryland.

One historical document that was not located but may still be extant somewhere is the diary of the plant commander. In previous research at the Indiana Army Ammunition Plant, Charlestown, Indiana, this document was of great assistance because it gave insights into the impact of the plant on the area as the Commanding Officer saw it, racial tensions both at the plant and in regard to the federally funded housing in the area, and the attitude toward German prisoners of war held there. It is not known at this time whether all commanding officers of GOCO facilities kept such diaries, but one World War II-era text states that "the Ordnance Department heads [at KAAP] maintain a daily diary of their department's activities" (Kansas Ordnance Plant [KOP] [1943]c:17). This probably applied to the plant commander as well. Another document not located but mentioned in historical records dealt with the agricultural activities conducted at the facility during the war. It is highly likely that this document, titled *History of the Kansas Ordnance Plant*From Agriculture to Ammunition Loading. Historical Report June*Sept. 1943 [sic]*, contains additional information on the fates of pre-war structures acquired by the government. Regarding both of these documents, it should be noted that researchers visiting the Suitland Branch of the National Archives and Records Administration were unable to pull all of the many boxes that may have contained information concerning KOP because of time restraints. There is a slight possibility that these documents are located there.

To supplement the information gathered from textual material, several oral history interviews were conducted. All of the informants worked at the facility during World War II. Only one, Robert Oxford, moved to the area for work after the plant was announced; the others had all grown up in the area. Although a more ideal mix and wider range of interviewees could have been hoped for, many of those contacted about being interviewed were reluctant to do so. Most felt they had little of value to offer and said they would rather not participate. In all, seven people were interviewed. One later declined to sign a release form authorizing use of the information gathered, so none of that information has been used in this report. Most of this information was available from other sources. Technical difficulties resulted in only half of one of the interviews being recorded.

The first interview was with James C. Gerdes, who worked at the plant for about a year beginning in February 1942. He had well drilling experience, and so helped with the drilling of the first water well at the plant. Born and raised near Parsons, he was able to give information about the changes the plant brought to the area. Winifred L. Morrow was born in Parsons, farmed in the area prior to the plant's arrival, and worked at KOP as an inspector during World War II. Approximately half of this interview was not recorded

² Oswego is the county seat of Labette County, in which both Parsons and KAAP are located.

³ One source at KAAP that would be of great benefit to future archeological work conducted at the facility are the topographic maps drawn by the architect-engineer prior to construction, showing many or all pre-installation structures. These are on file with the other architectural drawings, and the more than 50 sheets cover the entire facility.

⁴ The name is variously punctuated in the sources consulted during this research. For consistency, the name as currently used by the company will be used throughout the report.

due to a malfunction of the recording equipment, therefore references to this interview are cited as personal communication. Robert R. Oxford was a carpenter who moved to Parsons because of the construction work underway at the KOP site. With experience in the construction of Fort Leonard Wood Army Camp near Waynesville, Missouri, he felt sure he would be hired at KOP. He started in September 1941, and after the end of construction was hired to work as a carpenter in the Maintenance Division of the J-M Service Corporation (JMS), the operator of the facility. He continued to work at the plant until his retirement in 1968. Maxine L. Larsen began working at KOP in January 1942 in the Office Services section. She eventually became a secretary for one of the JMS managers. Josephine Habiger also began in clerical work, but soon transferred to the chemistry laboratory. She worked there until JMS began scaling back employees after V-E Day, turning down a job on a production line because she would have had to work a swing shift. Harold Cooper offered a different perspective of the facility. He owned and operated a restaurant during construction. He sold it in 1942 and went to work at the facility that fall, but left disappointed because he felt he was doing little of value there. He then went to work for the Missouri, Kansas and Texas Railroad Company (MK&T, known locally as the Katy). The comments from these interviews are interspersed throughout this report to provide both primary sources of factual data and to reveal the perceptions of the individuals who built and operated the facility.

CHAPTER 3

HISTORIC CONTEXT FOR KANSAS ARMY AMMUNITION PLANT, A WORLD WAR II ORDNANCE DEPARTMENT GOGO INDUSTRIAL FACILITY, 1941 - 1989

INTRODUCTION

Today, KAAP occupies almost 14,000 acres of Labette County, in southeastern Kansas (Figure 1). The plant is located approximately three miles southwest of the town of Parsons and is near U.S. Highway 160, which runs east and west, and U.S. Highway 59, running north and south. Although it is now inoperable, the tracks of the St. Louis and San Francisco Railroad form a portion of the northern boundary. The tracks of what was once the MK&T, recently acquired by Union Pacific, bound the facility along its southern and southwestern borders. The land lies between the Neosho River to the east and Labette Creek to the west and is gently rolling and lightly wooded. Parsons and the plant are approximately 150 miles south of Kansas City, Kansas, and 130 miles north of Tulsa, Oklahoma.

Construction of what was initially known as the Montana Parsons Project (Montana is a small community on the east side of facility—Figure 2; Parsons and Montana are shown in Figures 3 and 4) began on 18 August 1941 and was completed on 31 August 1942 (War Department 1942:1-A). By the completion of construction (see Figure 2), the facility occupied 16,797 acres and included over 100 miles of roads, 105,834 square yards of parking space, and about 28 miles of interplant railroad tracks (War Department 1942:12-13). The manufacturing area had eight production lines “for the loading of 105 mm shells, 155 mm shells, demolition bombs, fuzes, boosters, detonators, artillery primers, and the manufacture of amatol, and of nitrate of ammonia from neutral nitrate of ammonia solution for the foregoing types of ammunition” (War Department 1942:1). In general, buildings in the Administration and Maintenance areas were built of wood, those in production areas of vitrified clay tile. Ammunition storage igloos were constructed of reinforced concrete; warehouses for the storage of finished ammunition and inert materials were built of timber frame construction with vitrified clay tile walls (War Department 1942:1). The plant also had a standard trickle-filter waste treatment system that could treat up to a million gallons of water per day (War Department 1942:1-1A). Both drinking and process water were obtained from the Neosho River, although original plans had been to obtain these from subsurface sources. The first well drilled, however, produced unusable water too high in salinity to be of use for drinking or operations, so instead a dam was built across the Neosho River.

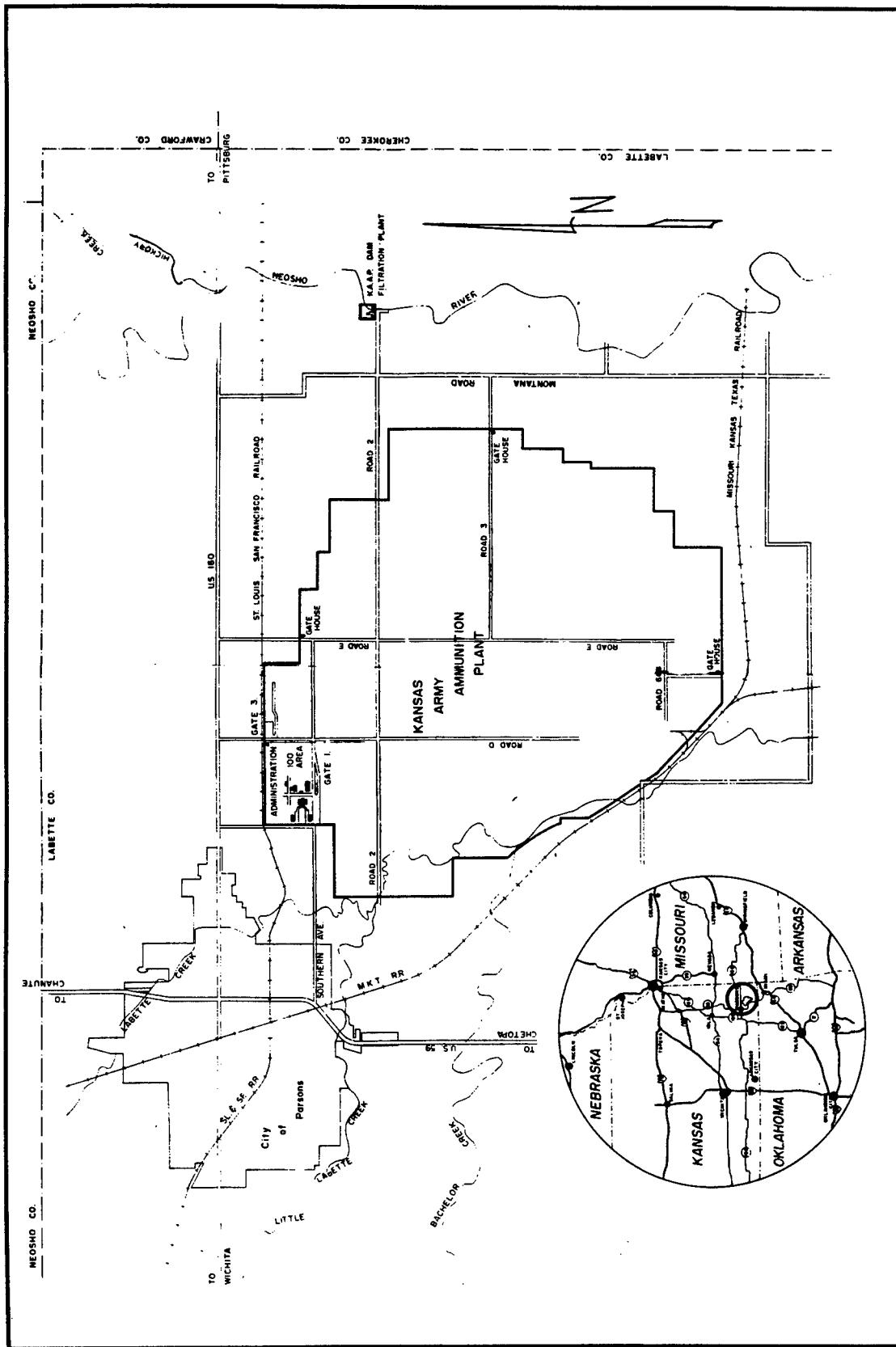


Figure 1. Location of Kansas Army Ammunition Plant (U.S. Army Corps of Engineers, KAAP Project 6, Drawing 16-06-02).

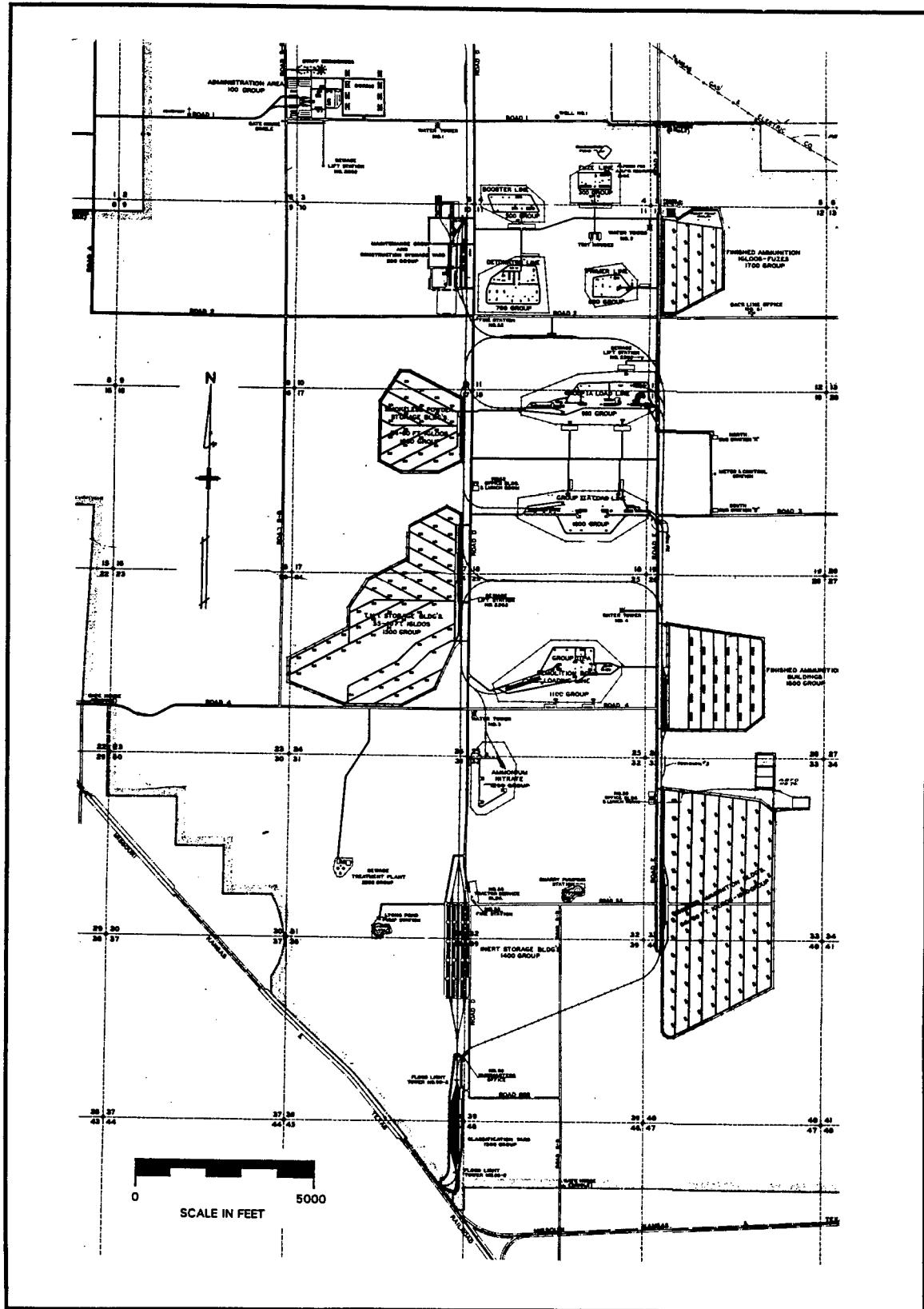


Figure 2. Layout of the Kansas Ordnance Plant, 1942 (Kansas Ordnance Plant, Drawing 7175-319, Sheet 1).

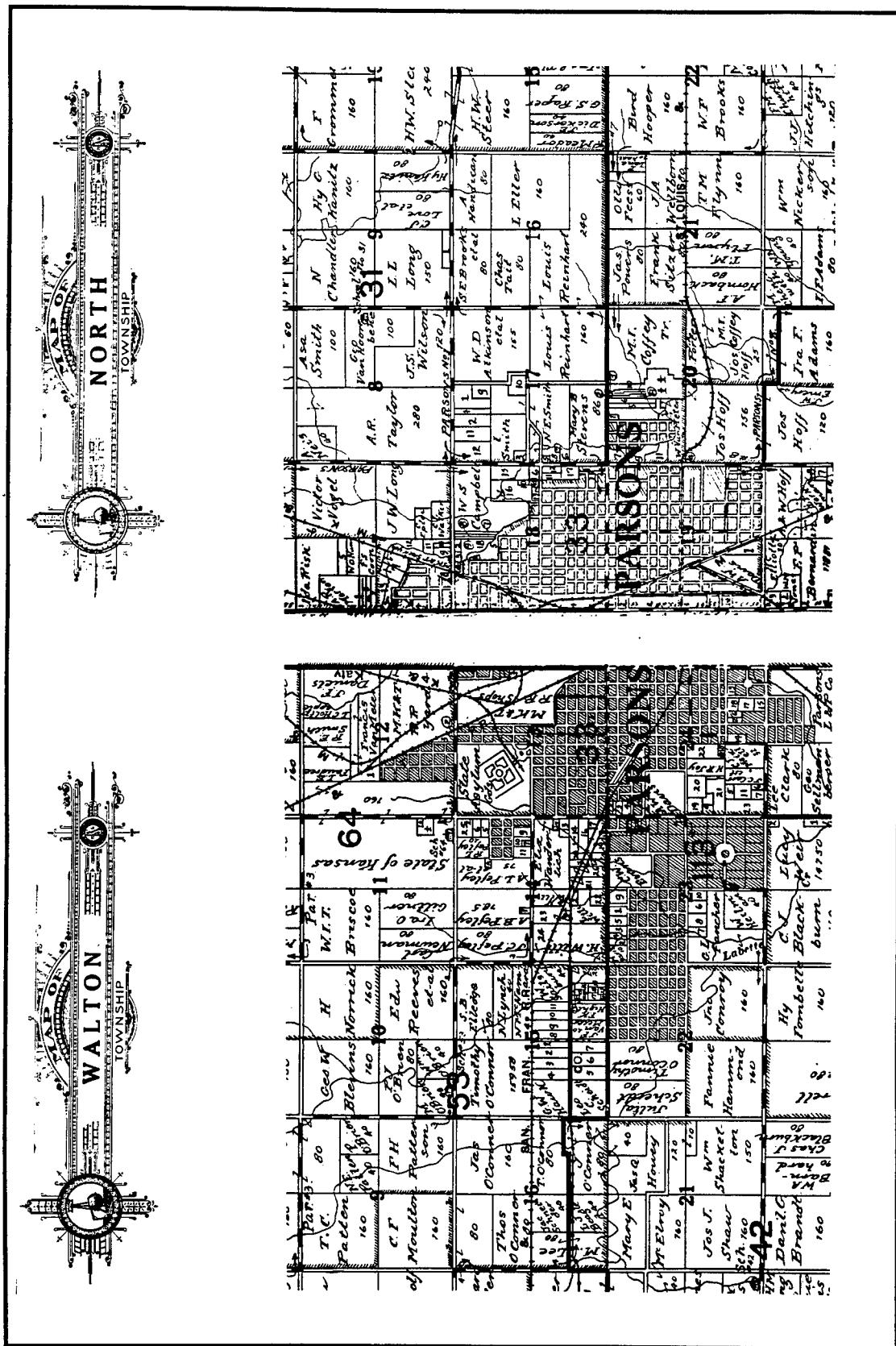


Figure 3. Map of Parsons, Kansas, ca. 1916. Compiled from sheets 11 and 13 in Wilkin 1916 (copy courtesy J. Gerdes).

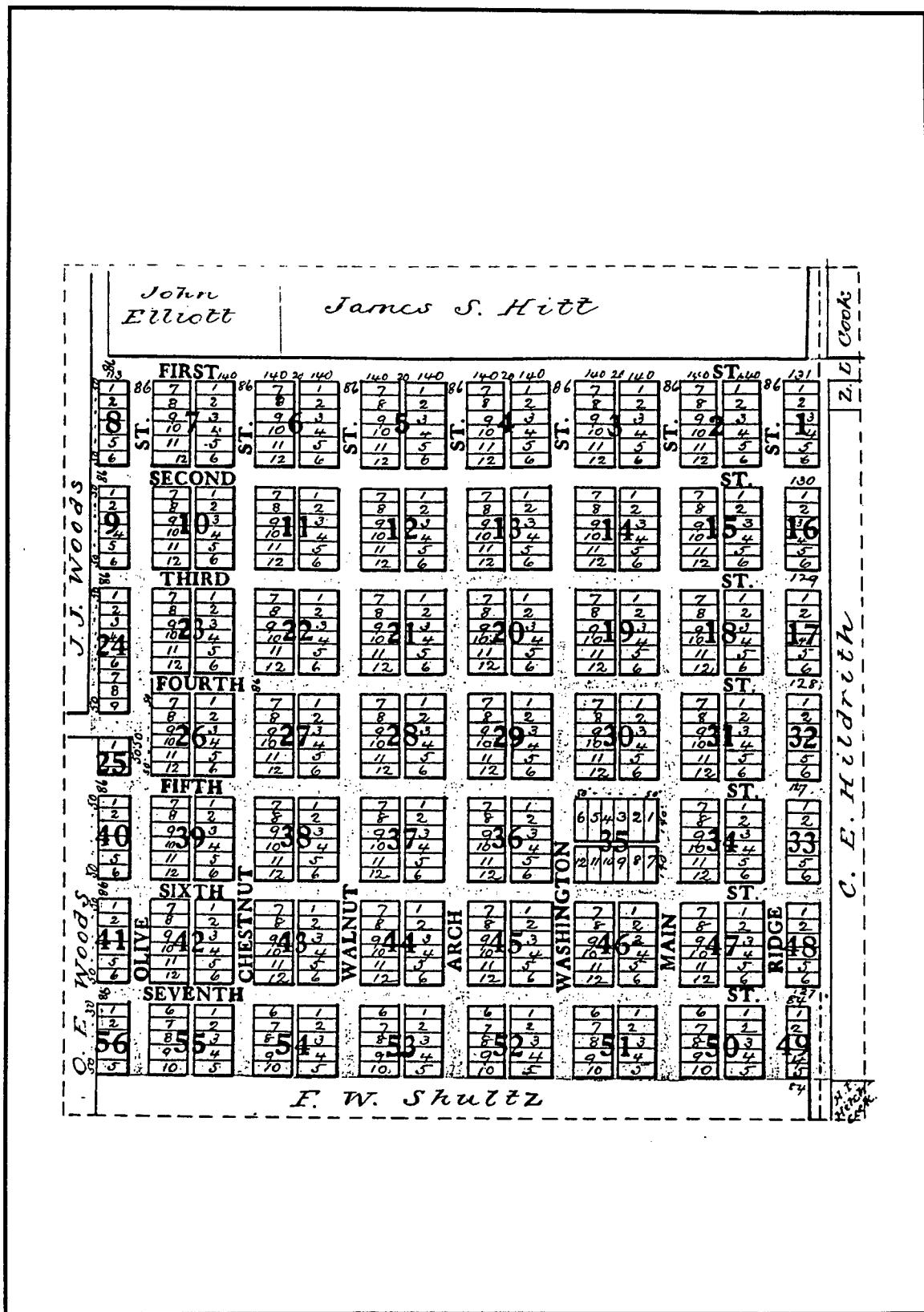


Figure 4. Map of Montana, Kansas, ca. 1916 (Wilkin 1916; copy courtesy J. Gerdes).

KOP's original mission was to produce ammonium nitrate and load 105-mm and 155-mm shells, bombs, and their components, which included detonators, primers, fuzes, and boosters (Voight 1945:160-161). JMS had expected to hire over 10,000 employees, but peak employment only reached about 75 percent of that figure, and some of the lines were closed after only operating a few months. The Bomb Load Line (1100 Area) was closed in November 1943 and converted to load 4.2-inch chemical mortar shells with high explosives. KOP had loaded some 4.2 ammunition in the first quarter of 1943 (KOP [1943]a:66), and these may have been among those used in Sicily that summer, the first time this type of shell was used in combat (Brophy et al. 1959:127). JMS believed KOP was the only plant filling the 4.2 shell with explosives in 1944 (KOP [1944]a:28), but other sources have not yet been located which confirm this. At some point during the war, explosives were loaded into the 4.2 shells at Louisiana Ordnance Plant, Picatinny Arsenal, and by Ordnance Department contractors National Fireworks, Inc., and National Munitions (Brophy et al. 1959:358). Another important event at KOP during this period was the development of the core melt unit, which made the filling of 105-mm and larger shells much more efficient.

The announcement to stop production at the plant came on 14 August 1945. In September, KOP became a stand-by facility and remained so until August 1950, being used primarily for the storage of surplus equipment and materiel. During that time, KOP was operated by the government rather than a private company. When the U.S. became involved in the Korean conflict, the plant was reactivated and the National Gypsum Company was awarded the operations contract. The mission during that war again involved loading bombs and shells, and the assembly of their component parts. KOP was placed in layaway in the summer of 1957, and it remained in that state until the mid-1960s. Its name was changed to Kansas Army Ammunition Plant in July 1963. In 1966, still operated by National Gypsum Company, KAAP was once more reactivated to produce munitions for the Vietnam War. Several areas underwent conversions, the most extensive being carried out in the 1100 Area. On 2 March 1970, Day & Zimmermann, Inc., of Philadelphia, Pennsylvania, became the operator of the facility. The plant remained in operation throughout the Vietnam War and into the early 1990s. The facility is currently inactive and slated for disposal.

THE MILITARY AND POLITICAL SETTING

World War I and the Interwar Years, 1918 to 1939⁵

All agencies involved in the procurement of materiel learned valuable lessons during World War I, lessons which meant the U.S. was much more prepared to enter World War II. Industrial mobilization for the two world wars form quite a contrast. No procurement system was in place prior to the First World War, and as a result War Department officials had little with which to build a procurement strategy. Unnecessary factories were built because an inventory of existing materiel production facilities did not exist (Green et al. 1990:24-25). Agencies within the War Department competed against each other for labor and supplies because there were no War Department personnel in charge of coordinating procurement (Hewes 1975:30). At one point during the war "more than 150 War Department purchasing committees were competing with each other for scarce supplies in the open market" (Hewes 1975:28), prompting one observer to describe the effort as "nearly a perfect mess" (Hewes 1975:29). One of the more serious results of the lack of coordination was an imbalance in production, giving the Ordnance Department "more guns than gun carriages, more gun carriages than recuperators, more machined shell bodies than booster assemblies" (Green et al. 1990:25). No attempt was made to rectify the problem until 1918, too late to benefit the war effort (Green et al. 1990:24-25).

⁵ This section is based heavily on the historical context written by historian K. L. Kane (1994). For a more in depth treatment of the topics here touched upon, the reader should also consult that document.

Although all problems were not alleviated, actions during the ensuing years made greater planning a necessity. For its part, Congress ensured that such a procurement experience would not again occur by passing the National Defense Act in 1920. Reorganizing the War Department and mandating that all military procurement be organized through the Assistant Secretary of War, this act helped prevent rivalry between the various arms of the military. In order to fulfill responsibilities designated to him under the act, the Assistant Secretary of War established the Planning Branch of the Office of the Assistant Secretary of War, which was put in charge of both procurement and industrial mobilization planning (Green et al. 1990:32). Cooperation between the two largest branches of the military was augmented in 1922, when Planning Branch personnel set up the Army and Navy Munitions Board (ANMB) to coordinate future procurement efforts of both service arms (Smith 1959:40-43). These two agencies, in conjunction with the Chief of Ordnance and the Manufacturing Service of the Ordnance Department, took care of interwar procurement planning for the Army (Green et al. 1990:30-32, 51).

Prior to and during World War II, the Ordnance Department was divided into three main sections. The General Office was in charge of administration, the Field Service handled maintenance and materiel distribution, and the Manufacturing Service took care of the design and manufacture of materiel (Green et al. 1990:32-33). The Manufacturing Service was redesignated the Industrial Service in 1938, and it was this section that administered the Ordnance Department GOCO Industrial Facilities Program during World War II. In 1939 the Industrial Service included Ammunition; Artillery, Aircraft, and Automotive; Small Arms; and Procurement Planning divisions and it managed several field agencies, among them the Ordnance Districts, Arsenals, Loading Plants, and Acceptance Proving Grounds (Green et al. 1990:84).

The Ordnance Districts and the Arsenals were the two agencies most important to procurement planning. The first, organized during World War I, were established to assist in "mobilizing local civilian industry for war production" (Green et al. 1990:26). Each Ordnance District was administered by a District Office and headed by a civilian District Chief prior to Pearl Harbor, and then by Ordnance Department officers thereafter (Campbell 1946:23). By 1940 there were 13 District Offices, in Birmingham, Boston, Chicago, Cincinnati, Cleveland, Detroit, Hartford, New York, Philadelphia, Pittsburgh, Rochester, St. Louis, and San Francisco (Thomson and Mayo 1991:13—KOP would be under the St. Louis District Office). The Industrial Service was also in charge of the six "old-line" arsenals—Springfield, Watervliet, Watertown, Rock Island, Frankford, and Picatinny, each of which specialized in the manufacture of particular ordnance items.

The Ordnance Districts were to keep in contact with potential contractors whose facilities could be converted to war production and to maintain records of the materiel manufacturing potential within their districts (Campbell 1946:11, 13, 18-22; Green et al. 1990:55; Thomson and Mayo 1991:13). They also conducted machine tool surveys, and their findings were important to the expediting of machine tool production during the mobilization period (Green et al. 1990:56-57), which allowed GOCO Industrial Facilities to be up and running sooner than would otherwise have been possible.

Arsenals were responsible for preserving the knowledge necessary for the manufacture of war materiel through times of peace (Campbell 1946:11, 35-37; Thomson and Mayo 1991:5). These facilities maintained "not only blueprints of components of weapons, ammunition, and vehicles, but carefully planned shop layouts and details of processing . . . for distribution to new contractors" (Green et al. 1990:7). During industrial mobilization efforts prior to World War II and during the war itself, personnel at these arsenals trained GOCO facilities contractors in manufacturing, inspection, and research and development procedures (Green et al. 1990:7).

Throughout the interwar years, Ordnance Department personnel worked with industry experts to plan for future production of propellants, explosives, and associated chemicals. Plans and specifications for "typical plants" were developed based on the "technical developments of Picatinny and Frankford Arsenals" (Thomson and Mayo 1991:11). A planning suboffice was established in 1937 in Wilmington, Delaware, in connection with this work (Campbell 1946:261). Picatinny personnel also worked on plans for "the design

and construction" of load, assemble, and pack (LAP) facilities, which proved to be a valuable resource for "the construction, management, and operation" of all such plants in the GOCO program (Campbell 1946:261-262), including KOP.

Although the Army was in charge of preparing the overall mobilization effort, the Ordnance Department used data from the District Offices and Arsenals to develop its own procurement and mobilization plans as well as to contribute to those developed by the Army during the interwar years (Green et al. 1990:51, 54-55). Three important assumptions underlay the Ordnance Department plans. First, it was assumed that most war materiel would be manufactured by private industry—the six old-line arsenals would only be able to produce four to five percent of the ordnance that would be needed during a war (Campbell 1946:5, 101, 397; Green et al. 1990:66; Thomson and Mayo 1991:9). Second, although some private factories could be converted to ordnance production, Ordnance Department planners felt that new industrial facilities would have to be constructed to produce many kinds of war materiel because there were no private factories in the U.S. manufacturing a great number of the ordnance items that would be necessary in the event of war. And third, planners assumed that such new facilities would be owned by the government. It seemed unlikely that private industry would be willing to finance (even if it could afford to do so) facilities that were almost certain to become unprofitable after war's end (Campbell 1946:112; Fine and Remington 1972:114). These three assumptions led planners to view a GOCO industrial facilities program as a major component of their overall procurement effort (Kane 1994:28).

Working against this effort for much of the interwar period was the tradition of American isolationism. The desire to avoid entanglement in political affairs and alliances abroad was well-established in American culture prior to the Revolutionary War. Although isolationism was doomed to failure in a world constantly shrinking due to advances in technology, it was still a defining element of American thought until at least 1941 (Drummond 1955:1), and isolationist sentiment was particularly strong in Kansas at the time (Davis 1976:196-199). There was an intense resurgence of isolationism after the First World War, when it spread "wider and deeper through the fabric of American thought than it ever had before in history" (Drummond 1955:21). Many felt the U.S. had been duped into wrongfully entering the war, and isolationists were convinced that steps should be taken to ensure that the country would not again be so foolish in the future (Drummond 1955:24-25). Kansas senator Clyde Reed, who would later help bring KOP to his hometown of Parsons, "fought tooth and nail against the lend-lease bill" (Davis 1976:197).

Anti-military and anti-arms producer sentiment also reached a high point after the First World War. There was a movement in Congress to show that "the true causes of America's recent intervention were to be found in the policies which bankers and industrialists had selfishly foisted upon the government during the long months of neutrality" (Drummond 1955:40). The repudiation of arms manufacturers issued by the U.S. Senate Munitions Inquiry, formed in the spring of 1934, is credited with great influence upon 1930s neutrality legislation and with keeping the issue of isolationism constantly at the focus of public debate (Drummond 1955:40-41). In 1936, polls showed that 82 percent of Americans were in favor of prohibiting "the manufacture and sale of munitions for private profit" (Drummond 1955:43).

Military budgets were severely cut during the interwar years, in part for the above reasons (Green et al. 1990:53), which adversely affected the budget of the Ordnance Department. The Depression prompted further reductions. However, by the mid-1930s the growth in military strength and aggressiveness of Germany, Italy, and Japan had escalated tensions and the possibility of international conflict to a degree that military appropriations in the U.S. began to increase. In 1938, which marked a turning point for the Ordnance Department, Congress awarded funding for the purchase of equipment needed for the manufacture of powder, small arms ammunition, and for the operation of LAP facilities (Thomson and Mayo 1991:11-12). That year U.S. firms also began supplying future American allies, working through a loophole in strict neutrality legislation (Drummond 1955:50) to supply foreign governments with "guns, rifles, ammunition, airplanes, and other military equipment" (Green et al. 1990:66).

Germany invaded Poland on 1 September 1939. Two days later Britain and France declared war on Germany. Within a week President Roosevelt proclaimed a state of limited national emergency (Green et al. 1990:65). In November, the European conflict steadily escalating, Congress altered neutrality legislation to permit "cash-and-carry" sales of materiel to nations at war (Green et al. 1990:66).

Hitler's ensuing successes during the spring of 1940 prompted further American assistance. Denmark fell in April, and in May the Germans invaded the Netherlands, Belgium, and Luxembourg. By the second week of May they had broken through the Maginot Line and began their advance toward Paris. According to U.S. law, only surplus materiel could be sold to Britain and France, and it had to be transferred indirectly. So "some five hundred thousand rifles, eighty thousand machine guns, and considerable quantities of field artillery, bombs and ammunition" were declared surplus and sold to U.S. Steel, which had agreed to act as intermediary in the transfer (Drummond 1955:149-150; Green et al. 1990:73). Prompted by the fall of France, President Roosevelt declared a state of unlimited national emergency on 27 May 1940 (Fine and Remington 1972:327).

Putting Plans into Action

On 25 June 1940, Acting Secretary of War Louis A. Johnson set up the War Department Site Committee, with the director of the Planning Branch of the Ordnance Department, Colonel Harry K. Rutherford, as its head. The committee developed basic criteria for choosing sites for the ammunition plants under the general guidelines that they were not to be east of the Appalachian Mountains, west of the Cascade or Sierra Nevada mountains, nor within 200 miles of the Canadian or Mexican borders (Fine and Remington 1972:134-135). Plants engaging in the same type of production were to be scattered so a single attack could not seriously cripple any one aspect of production. Planners were also to avoid highly developed industrial areas and to closely consider the technical, production, and transportation requirements of individual facilities (Fine and Remington 1972:134). The requirement that the plants be located away from highly developed industrial areas was intended to spread economic development farther afield and create more jobs in areas that needed them most, but rural locations would impede construction and production. Proximity to main railroad lines and to adequate amounts of suitable labor, more readily available in the urban areas than in rural locations, was considered to be more important by the Site Committee and the early GOCO contractors who were advising them—Du Pont, Hercules Powder Company, Atlas Powder Company, and Trojan Powder Company (Myers 1992:10). Proximity to the sources of the components they would be loading was also a consideration for the location of LAP facilities. In several instances, LAP facilities were paired with those producing smokeless powder (e.g., Elwood Ordnance Plant and Kankakee Ordnance Works, Lone Star Ordnance Plant and Longhorn Ordnance Works, Radford Ordnance Works and New River Ordnance Plant). Another important consideration was the availability of land. Buildings were to be widely spaced to ensure that an explosion at one point would not damage other buildings and cripple the entire facility. Tracts quite large relative to the combined floor space of the buildings were needed. KOP covered nearly 17,000 acres of land, much of which was used only as buffer zones to ensure safe operations.

With Hitler's stunning victories, Congressional opposition to increased defense spending vanished (Green et al. 1990:66-67). The first national defense appropriations act was passed 26 June 1940 (Campbell 1946:12; Thomson and Mayo 1991:44), and the Munitions Program was approved four days later. This latter program called for the manufacture of enough materiel to supply "1,200,000 ground troops, procurement of important long-lead-time items for a ground force of 2,000,000, creation of productive capacity for eventually supplying a much larger force on combat status, and production of 18,000 airplanes" (Thomson and Mayo 1991:12). This paved the way for the appropriation of the first major sum for facilities construction (\$436 million, approved 1 July 1940), and for the signing of the first GOCO facility contract, the beginning of what is termed the "first wave" of GOCO construction. During the remaining months of 1940, contracts were signed for the construction of several more GOCO facilities widely dispersed over the eastern half of the United States. And during 1941, contracts were issued for many more plants, 13 of which were new LAP facilities (Gaither 1994:12), including KOP.

The bombing of Pearl Harbor had a profound impact on the munitions buildup, initiating another “wave”⁶ of defense construction, this time under the direction of the Corps of Engineers, the organization to which all defense construction had been transferred effective 16 December 1941 (Fine and Remington 1972:476). “For some months [prior to the attack] the construction program had shown signs of tapering off. It was now certain that much more work would be coming” (Fine and Remington 1972:477). The entry of the country into the war brought about renewed effort to achieve a common end. Striking workers went back to their jobs and Congress dropped objections to the manner in which defense contracts were awarded and carried out. “Recalling ‘the beating we took’ before the House committee in November, Colonel [Ewart G.] Plank described what happened on the Monday after Pearl Harbor. ‘We were just given a blank check,’ he said. ‘That’s how quickly the damn thing changed’” (Fine and Remington 1972:478).

On 8 December General Campbell outlined the areas of concentration for the new construction effort. Appropriations came soon thereafter, the first approved on 17 December, freeing up “more than one and a quarter billion in construction funds” (Fine and Remington 1972:479). Plans were worked out in more detail during the ensuing month, and the Ordnance Department developed a munitions program that included the construction of four new TNT plants, 10 new LAP facilities, and one manufacturer of gun tubes, some of which were already in contract. The new LAP facilities, of course, included KOP (Table 1).

The GOCO Agent-Operators

The companies selected to run GOCO facilities, called “agent-operators” (Thomson and Mayo 1991:113), represented a wide variety of business backgrounds. The Ordnance Department awarded early contracts to companies that already had experience in specific areas of defense production. These included companies like Atlas Powder Company and E.I. duPont de Nemours & Company for powder production, and “industrial chemical firms and . . . oil refining companies for the manufacture and processing of chemicals” (Thomson and Mayo 1991:112), as well as the Remington Arms Company, which produced small arms ammunition. However, when looking for potential agent-operators of LAP facilities, the Ordnance Department had to broaden the scope of its search since there were almost no companies “with experience in the LAP of artillery ammunition, bombs, fuzes, boosters, detonators, and other items of military ordnance” (Kane 1994:42). The first LAP facility, Ravenna Ordnance Plant, was operated by the Atlas Powder Company, a smokeless powder producer that at least had experience working with explosives. Thereafter, though, “the Ordnance Department relied upon companies that had never worked with war materiel to run most of its GOCO LAP facilities” (Kane 1994:42).

By the time the KOP contract was awarded, the War Department was drawing on a wide range of companies to act as agent-operators, including such seemingly unlikely contractors such as Procter and Gamble, the Tennessee Eastman Corporation, Coca Cola, Sherwin-Williams, Chrysler, Certain-teed Products Corporation, and, at KOP, Johns-Manville Corporation, an asbestos supplier and insulation manufacturer. The criteria the Ordnance Department used were similar to those listed in a statement of contracting principles issued by the National Defense Advisory commission in September 1940 and endorsed by President Roosevelt the same month. These principles stated that contractors were to be chosen based on the speed, quality, and price of their work, and their experience, character, and financial status (Fine and Remington 1972:160).

⁶ Although it is often used, the term is better for its imagery than for its precise meaning. Waves of construction are only explicitly defined for small arms ammunition facilities, and the second wave of construction of these plants (which involved Des Moines, Twin Cities, and Utah ordnance plants) began in September and October of 1941 (Voight 1945:40-43), prior to the bombing of Pearl Harbor, which is generally considered the beginning of the second wave of construction for the overall mobilization program.

Table 1
Contract Dates for GOCO Load, Assemble, and Pack (LAP) Plants

Date	Facility	State
-----	Redstone Ordnance Plant*	Alabama
26 August 1940	Ravenna Ordnance Plant	Ohio
19 September 1940	Elwood Ordnance Plant	Illinois
6 November 1940	Iowa Ordnance Plant	Iowa
8 November 1940	Kingsbury Ordnance Plant	Indiana
17 December 1940	New River Ordnance Plant	Virginia
31 December 1940	Hoosier Ordnance Plant	Indiana
31 December 1940	Wolf Creek Ordnance Plant	Tennessee
20 February 1941	Coosa River Ordnance Plant	Alabama
10 July 1941	Louisiana Ordnance Plant	Louisiana
19 July 1941	Arkansas Ordnance Plant	Arkansas
23 July 1941	Lone Star Ordnance Plant	Texas
4 August 1941	Mississippi Ordnance Plant	Mississippi
6 August 1941	Kansas Ordnance Plant	Kansas
18 August 1941	Illinois Ordnance Plant	Illinois
9 December 1941	Nebraska Ordnance Plant	Nebraska
30 January 1942	Green River Ordnance Plant	Illinois
9 February 1942	Bluebonnet Ordnance Plant	Texas
18 February 1942	Sangamon Ordnance Plant	Illinois
27 February 1942	Cornhusker Ordnance Plant	Nebraska
9 March 1942	Oak Ordnance Plant	Illinois
10 March 1942	Pantex Ordnance Plant	Texas
11 March 1942	Vigo Ordnance Plant	Indiana
3 April 1942	Scioto Ordnance Plant	Ohio
16 April 1942	Gulf Ordnance Plant	Mississippi

* Contract canceled before production began; government operated facility as Redstone Arsenal for the duration of the war (Voight 1945:274-279).

Sources: Anonymous n.d.:I:188; Voight 1945; War Department n.d.:40-43.

The Dual Nature of the CPFF Contract

Major I.T. Malmstrom, the Commanding Officer of KOP during most of the war, said that “with speed the primary and economy the secondary consideration in time of war, the Cost-Plus-A-Fixed-Fee Contract is the only practical solution to the efficient development of new Ordnance production facilities” (KOP [1942]:127). But this was not the prevailing thought of the period in all arenas. Cost-Plus-A-Fixed-Fee (CPFF) contracts were widely used for both the construction and operation of GOCO facilities during World War II—and widely criticized, due in part to their similarity to contracts used during World War I. Contracting practices during that war led to accusations of favoritism, waste of tax dollars, and corruption (Fine and Remington 1972:26-27), attributed in part to the widespread use of cost-plus (CP) contracts, which reimbursed contractors for costs and paid them a percentage of those costs as profit. This type of contract encouraged contractors to pad expenditures as a means of increasing the fees they were paid, and thus, their profits. For

this reason the CP contract was abandoned in 1918, when the floating fee was replaced with a fee of a fixed amount determined at the time the contract was let (Fine and Remington 1972:23). This was an improvement, but the earlier problems had strongly stigmatized cost-plus contracting in general, particularly in the minds of politicians (Fine and Remington 1972:389).

Still, cost-plus contracts were viewed as a necessary means of industrial mobilization, especially by the military, and most of the contracts between the Ordnance Department and the operators of World War II-era GOCO facilities were CPFF in nature. Lieutenant General Levin H. Campbell, who served as Chief of Ordnance from 1942 through 1946, believed the CPFF contract to have been "a major contribution to the success of the nation's war production program" (Campbell 1946:108). Perhaps the most important aspect of the CPFF contract was that it bypassed the lengthy process involved in competitive bidding that was the standard method of awarding government contracts during peacetime (Patterson 1941:336; Thomson and Mayo 1991:110) and was a great advantage in a war mobilization effort that needed to be accomplished in the relatively short span of 12 to 18 months (Fine and Remington 1972:574). It also offered flexibility in undertaking a job for which no accurate means of determining overall costs existed (Polenberg 1972:12; Thomson and Mayo 1991:16). The CPFF-type contract assured contractors of a profit, a necessity if they were to be drawn away from civilian markets that appeared much more lucrative and worth investing in compared to capital-intensive military production of products that offered no promise of a long-term market. And it eliminated some of the incentive to perform more costly work that may have been inherent in the earlier CP-type contracts. In the words of Secretary of War Henry L. Stimson, "if you are going to try to go to war, or prepare for war, in a capitalist country, you have got to let business make money out of the process or business won't work" (Polenberg 1972:12).

Detractors of the CPFF contract, on the other hand, believed this type of contract was not the best way to "let business make money out of the process" because it too often allowed exorbitant profits to be made. And in some cases they were right. By 1944, fees paid to operators had been reduced three times, and some said they were still excessive (Thomson and Mayo 1991:113, 130). Contracts for construction and architect-engineer work spawned the more heated debates concerning excessive fees, most notably during well-publicized hearings held during the 1940s, when the Truman Committee conducted its investigation into defense construction contracting. The committee found that the earnings of the 25 architect-engineer firms they investigated were on average 300 percent higher than they had been during peacetime (Fine and Remington 1972:423). And investigations like that of the House Military Affairs Committee, which looked into the cost of construction of the Louisiana Ordnance Plant, found construction fees were also excessive (Campbell 1946:109).

Several methods were developed by the government to combat unreasonably high earnings. An excess profits tax was approved in October 1940 and the first Renegotiation Act was approved in April 1942. Six months later an amendment to the act made all contracts worth more than \$100,000 open to renegotiation. After this legislation was passed contracting agencies had three new and powerful means of combating excessive profits—they could make the contractor return a portion of the profits to the government, cut the fees stipulated in the contract, or deduct the amount determined to be excessive from future reimbursements.

Evidencing the pros and cons of the CPFF-type contract is a letter dated 21 March 1941 to Levin Campbell from I.T. Malmstrom, then the Construction Quartermaster for the Kankakee Ordnance Works, Joliet, Illinois. He felt that there was "no doubt [that] much improvement could be made in the present system of construction and control of contracts" (KOP [1942]:127), but that steady progress was being made in the letting of CPFF contracts, all of which would be lost by a switch to awarding lump sum contracts, which Campbell was apparently considering. "No doubt the letting of a lump sum contract for construction and a lump sum contract for engineering inspection would be an excellent handling of the matter. I doubt, however, whether enough plans, specifications, topography [topographic information?], etc., could be furnished bidders so that the United States would get an economical, intelligent lump sum bid" (KOP

[1942]:128). After discussing specific problems with furnishing such plans and specifications, Malmstrom concluded that

though it is evident that a different method of letting contracts than is in vogue now would be better for the program as a whole, it would mean the abandonment of a system which is workable for something untried. It would be better to utilize the thought and energy necessary to set up and administer the new system in bettering, smoothing out and making more efficient the present system. This possibly, might be done by better co-ordination and co-operation between the Ordnance Department and the Quartermaster Corps, better co-ordination between the different departments of the Quartermaster Corps, and further delegation of authority to the field (KOP [1942]:128).

Temporary Versus Permanent Construction

Initial costs at many of the first GOCO industrial facilities were running far over-budget, in part because the structures, utilities, and transportation networks were being built with permanent rather than temporary utilization in mind. By early January 1941, "the Ordnance Department had accumulated \$100 million of cost overruns" (Kane 1994:115). The Army immediately began economizing by altering the materials and design of buildings and layout wherever possible. With the cost of the "arsenal of democracy" escalating quickly, economy surpassed long-term durability and speed as the overriding consideration. "The first to be cut were amenities such as air conditioning and tile in bathrooms in staff housing and high cost features such as slate roofs" (Kane 1994:115). On 8 January 1941, Lieutenant General Campbell forbade the building of brick dwellings at plants and eight days later called for the modification of administration building designs. "It is more desirable to effect economics than to have elaborate buildings," he declared to Brehon B. Somervell (Chief of Construction, Quartermaster Corps), who concurred, observing that "there has been a leaning toward grandeur" (Fine and Remington 1972:316). Somervell worked with Colonel Leavey to map out a new strategy to cut costs in construction. In a memorandum to the field he stated that

there is no excuse for masonry structures, monumental or otherwise, where a light frame structure will serve the purpose. There is no excuse for the use of expensive materials where less costly ones will serve the purpose for the period of time for which the construction is being provided. There is no excuse for a heavy duty road where a lighter type will . . . provide for anticipated traffic with reasonable maintenance costs. There is no need to design railroads for a speed of 90 miles an hour within the confines of a . . . manufacturing plant (Fine and Remington 1972:317).

Somervell sent orders to all construction sites instructing commanding officers and constructing quartermasters to survey their plant plans for unnecessary frills and ways to cut costs. He ordered blueprints for permanent facilities scrapped for many late projects, including all bag and shell loading plants (Fine and Remington 1972:317). These orders were well-established by the time the contract for KOP was awarded. At the Parsons facility, steel was seldom used as framing members. Non-manufacturing buildings were generally of wood frame construction with wood exterior siding. Hollow clay tile was generally used for the wall construction of manufacturing buildings, but most support columns were of wood construction.

The construction of more temporary rather than permanent structures was furthered at a February 1941 meeting between Somervell and General Harris, Chief of the Industrial Service. They tentatively decided that architect-engineers designing GOCO facilities would have to base those designs on standardized plans for temporary mobilization construction that had been developed by Quartermaster Corps personnel (Fine and Remington 1972:354-355). In March, the decision was made official, on condition that the Chief of Ordnance be allowed to approve all Quartermaster Corps plans (Fine and Remington 1972:358; Kane 1994:116), and this plan governed the design of many individual structures at KOP.

THE KANSAS ORDNANCE PLANT

The decision to look for a location to build a GOCO facility near the town of Parsons may have been due in part to the actions of the Parsons Chamber of Commerce, which in July 1940 began working to attract a defense plant to the area, preparing “data for the brief which was filed with the ordnance department [sic] in August of that year” (VOX KOP 1942i). U.S. Senator Clyde Reed, a native of the town, also used his influence in Washington to bring a plant to the area (Larsen, interview 1995; Oxford, interview 1995). Black and Veatch, Consulting Engineers, operating out of Kansas City, conducted the initial survey of 21,000 acres in early 1941 under contract to the Omaha Constructing Quartermaster. The company submitted its findings in April⁷, which concluded that “the site was well adapted for construction, had an adequate supply of labor available, utilities [sic] could be made available at a reasonable cost, living conditions were up to the acceptable standard, and transportation was satisfactory. In view of this report, they recommended the site be approved from an engineering and construction standpoint” (KOP [1967]:1). The flat to slightly rolling land was also considered to have little agricultural value (Voight 1945:160).

Of the various considerations the Site Committee thought important to the location of ordnance plants, perhaps the most important for LAP facilities was access to good transportation, primarily railroads. Not only was Parsons located at a point where a St. Louis and San Francisco line crossed an MK&T line (Voight 1945:161), it was also the headquarters of MK&T railroad. The site was well away from U.S. borders with Mexico and Canada, and well inland, both important security considerations. And Parsons met the Site Committee’s wishes for rural locations for the plants. It had some industry but was still considered rural, yet there was a fairly large labor pool in the small- to medium-sized towns within a 50-mile radius, such as Parsons, Oswego, Independence, Pittsburg, and Coffeyville.

Although the survey by Black and Veatch was completed in the spring of 1941, an agent-operator was not finally secured until the end of the summer. Lieutenant Colonel Otto M. Jank was selected to be the first commanding officer of the facility on 9 August of that year. He had previously served in the same position at the Iowa Ordnance Plant, an LAP facility similar to what was to be constructed at Parsons, and had seen the Iowa plant through construction and initial production. He was chosen, according to Major I.T. Malmstrom, a later KOP commanding officer, because personnel with some previous experience in this specialized work was important to the successful and quick construction of the facility (KOP [1942]:6). Three days later the J-M Service Corporation (JMS), a subsidiary of Johns-Manville Corporation, New York, was awarded the contract to build and operate the facility (Contract W-ORD-518 DA-W-ORD-5)⁸. In the same contract, Peter Kiewit Sons’ Company and George W. Condon & Company, both of Omaha, Nebraska, along with Paschen Construction, Inc., of Chicago, Illinois, were awarded the construction contract, which estimated the cost at \$24,532,563. And four days later, the architect-engineer contract was awarded to the two firms of Consoer, Townsend and Quinlan; and Battey & Childs (hereafter referred to together as CTQB&C), both from Chicago, Illinois (Contract W-ORD-518). Both were CPFF-type contracts (KOP [1942]:8; War Department 1942:Field Progress Report, Part D).

The JMS engineering department was to manage the entire project, “act[ing] in an advisory and supervisory capacity” (KOP [1942]:59), overseeing the work of the architect-engineers and the general contractors. JMS began hiring additional engineers in October 1941, several of whom spent all their time working with the two

⁷ The report Black and Veatch generated detailing the results of their survey—“Report of Findings to Zone Constructing Quartermaster of Zone 7 on Montana-Parsons Kansas Area for Proposed Ordnance Project, 1941”—was not located in the course of research for this project.

⁸ This contract could have been awarded about a week earlier, on 6 August (Voight 1945:160). Since the actual contract was not located in the course of research, the precise date is not known.

architect-engineer subcontractors. Eight additional engineers were hired to work only on equipment engineering. "Each of these eight engineers was assigned to one of the eight operating lines which comprised the production operations" (KOP [1942]:59-60). They were sent to other munitions facilities to become familiar with the equipment in use and operating procedures.

The [Engineering] Department also worked in close association with the Production Planning Department in the layout and arrangement of the operating lines, but they were limited in their freedom of thought and originality by the fact that "typical" layouts and equipment arrangements furnished by the Government had to be followed closely. Since deviations from typical drawings could not be made without approval from the Ordnance Department in Washington, which procedure consumed much valuable time, the typical drawings were followed with few exceptions. Later on, when the plant was in operation, it was necessary to make many changes to secure a more efficient operation which resulted in greater production at less cost (KOP [1942]:60).

The Architect-Engineers for the Facility

L. C. Childs, of Battey & Childs, arrived at the site 11 August 1941 to begin working on "the preliminary layout and manage operations of the Architect-Engineers" (KOP [1942]:n.p.). Research did not reveal the location or any of the history of the firm of Battey & Childs. Bill Plautz, who works for Consoer, Townsend & Associates, remembered the firm but said that he had not heard the name mentioned for some years and felt they probably no longer existed (personal communication 1995).

The other company involved in the design of KOP was the partnership of Consoer, Townsend and Quinlan, offspring of the Consoer Engineering Company, founded by A.W. Consoer just after the end of World War I. Before the war, A.W. Consoer had worked as a bridge engineer for the Illinois Department of Transportation; and during World War I, both he and his brother George O., who would later work at the KOP construction site (Plautz, personal communication 1995), were commissioned in the Army Corps of Engineers. While George remained in Europe after the end of the war, A.W. returned to the U.S. and set up Consoer Engineering, incorporated in December 1919. George joined his brother shortly thereafter (Consoer, Townsend & Associates 1990:2-3).

During its early years of existence, Consoer Engineering was primarily commissioned to develop plans for municipal improvement projects, working on several sewer and water system and road paving projects. The firm expanded rapidly in the 1920s, serving about 15 municipalities by 1923, and growing to a staff of 100 by 1925. Two new partners joined the firm during this period, and the name was changed to Consoer, Older & Quinlan to reflect the change in ownership. The company entered the Depression Era as "the largest practicing municipal engineering firm in the Chicago area" (Consoer, Townsend & Associates 1990:4). With municipalities unable to finance large projects during the 1930s, many engineering firms went out of business. However, the financial acumen of George Consoer enabled the company to survive the difficult period of the early 1930s, although the number of employees on staff did shrink to only 15. The business activities during the period included construction on the 1933 Century of Progress Exposition in Chicago and the design of several sewage treatment facilities; the latter experience helped the firm become involved in the reconstruction programs of the Roosevelt administration.

During this period, a growing percentage of the firm's work was in sanitary engineering projects, and in 1933 Darwin Townsend left his position as Acting Chief Engineer of the Milwaukee Sewage Commission to join the firm. Townsend had "pioneered the activated sludge treatment process in Milwaukee, [so] his affiliation gave the firm instant credibility in wastewater treatment. The firm's name was changed to Consoer, Townsend & Quinlan, reflecting the prominence of his reputation" (Consoer, Townsend & Associates 1990:6). By 1942, the staff had grown to 75, approaching its pre-Depression level. In addition to overseeing the construction of the Kansas Ordnance Plant, Consoer, Townsend & Quinlan "designed and

supervised the construction of the Army Camp and Airport at Truax Field in Madison, Wisconsin" (Consoer, Townsend & Associates 1990:7), and was involved in a variety of other defense-related projects in eight states. "A.W. Consoer went to Washington, volunteering 16 months of his time as a consultant to the Chief of Engineers. The Army cited him for meritorious service in 1946" (Consoer, Townsend & Associates 1990:7).

The Layout and Building Designs at KOP

The general layout of KOP was adapted to the "terrain for economy of construction and economic utilization of materials" and designed to be "an efficient operating layout" (KOP [1942]:n.p.). The layout was approved by the Chief of Ordnance on 3 September 1941 (KOP [1942]:14). The architect-engineers divided the facility into 16 main functional areas (see Figure 2); six groups of buildings not confined to any one area (Table 2)—a general or miscellaneous group (buildings with number designations of less than 100); the water system (2100 Area); the sewage system (2200 Area); roads and parking areas (2300 Area); and the electrical system (2400 Area); and the 1300 Area, which included both the onsite railroad system and the classification yard at the far south end of the plant (War Department 1942:18-19).

Table 2
Main Functional Areas and Completion Dates for the Architectural Drawings
at Kansas Ordnance Plant

Area Name	Area	Date Drawings Begun*	Date Drawings Completed*
Miscellaneous Buildings			
Administration Area	100 Area	16 August 1941	22 August 1942
Maintenance Area	200 Area	1 October 1941	24 December 1941
Fuze Load Line	300 Area	1 October 1941	16 October 1941
Booster Load Line	500 Area	1 October 1941	1 December 1941
Detonator Load Line	700 Area	28 November 1941	26 December 1941
Primer Load Line	800 Area	11 December 1941	29 December 1941
Shell Load Line	900 Area	31 October 1941	16 December 1941
Bomb Load Line	1000 Area	31 October 1941	16 December 1941
Demolition Bomb Load Line	1100 Area	22 September 1941	31 October 1941
Ammonium Nitrate Plant	1200 Area	22 October 1941	10 December 1941
Railroads and Classification Yard	1300 Area	9 September 1941	10 September 1941
Inert Storage Buildings	1400 Area	8 August 1941	22 November 1941
High Explosive Storage	1500 Area	28 August 1941	19 November 1941
Smokeless Powder Storage	1600 Area	1 October 1941	18 October 1941
Fuze and Booster Igloos	1700 Area	16 October 1941	18 December 1941
Finished Ammunition Buildings	1800 Area	19 September 1941	19 December 1941
Finished Ammunition Igloos	1900 Area	14 October 1941	15 December 1941
Water System	2100 Area	4 September 1941	18 June 1942
Sewer System	2200 Area	29 September 1941	7 October 1941
Roads and Parking Areas	2300 Area	30 September 1941	10 October 1941
Electrical System	2400 Area	17 September 1941	22 August 1942

* Since two discrepancies were noted between these figures and text in the plant history—directions to redesign the Fuze Load Line were received in December (KOP [1942]:42), and the architect-engineers were instructed to reduce the amount of the railroads near the end of September (KOP [1942]:14)—these dates may not be entirely accurate. Therefore no attempt was made to determine whether the use of typical layouts saved time on the part of the architect-engineer.

Sources: War Department 1942:2-9, 18-19.

As can be seen in Figure 2, the layout was arranged according to function, with all production areas in a column running through the center of the facility, storage buildings on either side. The igloos for storing TNT and smokeless powder were stored on the west side, near the three shell and bomb lines, where most of that material was to be used. Finished ammunition was stored on the east side; components in the 1700 Area just east of the four component lines; and bombs and shells in the two larger finished ammunition groups to the south and east of the shell and bomb load lines. Materials generally moved through the plant in a circular pattern—north from the Classification Yard along Road D to inert materials or explosives storage, east through the production line, south and east to storage, then back to the Classification Yard for transfer away from the facility.

These areas were separated from each other by standard safe distances determined by the types and amounts of explosives used in the various areas; the same formulas were used to calculate the distances between buildings. In line with Somervell's instructions of the preceding January, the use of steel was to be avoided (Table 3). All buildings were to be wood-framed, walls were to be of wood or vitrified clay tile, and roofs would be shingles over wood sheathing, which was decided to be the "most economical general plan" (Indiana Ordnance Works [IOW] [1942]:14). Figures 5-7 show wood-framed structures at KOP. It seems that initial plans were to connect all buildings in the production and storage areas via an extensive rail network, but near the end of September the architect-engineers received word that they would have to cut the amount of track on the facility from 125 to 30 miles. Another means of saving steel, the change eliminated both the need for track and for engines and freight cars. Instead, transportation was to be provided by truck (KOP [1942]:14).

As per the directions of the Ordnance Department and the Quartermaster Corps, typical layouts and equipment arrangements for the production areas were used quite extensively by the architect-engineers. These came not only from Picatinny Arsenal, the "old line" facility specializing in the production of artillery ammunition and explosives (Green et al. 1990:7), but also from other GOCO facilities. It appears that Picatinny drawings were considered first, but if the buildings and equipment would not be able to meet production requirements stipulated in the operations contract between the Ordnance Department and JMS, the architect-engineers turned to other sources. The Fuze Loading Line (300 Area) needed to be able to "load all fuzes needed by the shell and bombs [produced] in Groups I, II and III [the 900, 1000, and 1100 areas, respectively]. . . . [However,] the contract rate for the loading and assembly of about 40,000 M48 fuzes per day, in addition to 5,760 bomb fuzes and 8,400 M21 fuzes, was found to be far less than that possible from a Picatinny Arsenal planned typical loading line" (KOP [1942]:42), so other typicals were used, although the plant history does not state where these originated.

There were originally planned two complete separate fuze lines for the Kansas Ordnance Plant. . . . Early in December 1941 a new typical drawing was received with instructions that the line for loading bomb fuze[s] be combined with that for HE [high explosive] shell fuzes and that mercury fulminate preparation buildings should not be included, as there would be available facilities in the detonator line to permit the preparation of primer mix outside the fuze area.

A second adjustment was made in design when it was decided that preparation of black powder and the consolidation of fuze delay pellets should be done in the artillery primer line. Originally the fuze line was planned to be one of the earliest producing units so that supervisory training and equipment planning, as well as preliminary layouts, were well under way January 1, 1942 (KOP [1942]:42-43).

Contractual requirements for the Booster Loading Line (500 Area) stated that it needed to be able to produce "all booster and tetryl pellets for fuzes that might be required by components for the two (2) shell and one (1) bomb loading lines. This capacity was to be about 40,000 M20 and 10,000 M21 boosters per day, in addition to fuze pellets and M102 adapter boosters and M104 auxiliary boosters for 2,880 bombs per day" (KOP [1942]:34). There is no mention of whether Picatinny typicals were used in the design of this line and the structures therein, but the engineers did draw on their visits to that facility—"the booster loading line

Table 3
Main World War II-Era Structures at Kansas Ordnance Plant

Building Name	Number	Notes on Construction
<i>Miscellaneous Buildings</i>		
Fire Station	2	concrete pier foundation, concrete floors, wood frame, tile walls
Central Testing	1	concrete pier foundation, concrete floors, concrete and wood frame, concrete walls
Laboratory	1	concrete wall foundation, wood over concrete floors, wood frame, tile walls
<i>Administration Area (100 Area)</i>		
Administration Building	1	wood frame and walls, two-story with basement
Cafeteria	1	concrete pier foundation; wood floor, frame, and walls
Employment Office	1	concrete wall foundation; wood floor, frame, and walls
Hospital, 528-bed capacity	1	concrete wall foundation; wood floor, frame, and walls
Guard House	1	concrete wall foundation; wood floor, frame, and walls
Boiler House	1	concrete wall foundation, concrete floor, concrete tile and steel frame, concrete tile walls
Laundry and Dry Cleaning Building	1	concrete wall foundation, wood frame, tile walls
Staff Houses	20	modular, wood frame and wall construction on concrete block foundation
Dormitories	8	wood frame; two-story with basements
Other buildings in the Administration Area were of wood frame construction with wood exterior siding.		
<i>Shop and Maintenance Area (200 Area)</i>		
Locomotive and Auto Repair Shop	1	concrete wall foundation, concrete floor, wood frame, tile walls
Maintenance and Repair Shop	1	concrete wall foundation, concrete floor, wood frame, concrete and tile walls
Carpenter Shop	1	concrete and wood floor, wood frame, wood and asphalt shingle walls
Office and Change House	1	concrete wall foundation, concrete floor, wood frame, tile walls
Boiler House	1	concrete wall foundation, concrete floor, wood frame, tile walls
Warehouse	17	wood frame construction
<i>Fuze Load Line (300 Area)</i>		
Primer Loading Building	1	concrete wall foundation, concrete and "rubble" (rubber?) floor, wood frame, tile walls
Delay Loading Building	1	concrete wall foundation, concrete and rubber floor, wood frame, tile walls
Change House	2	concrete pier foundation, concrete floor, wood frame, concrete and tile walls
Boiler House	1	concrete wall foundation, concrete floor, wood frame, tile walls
Fuze Assembly Building	2	concrete wall foundation, concrete floor, wood frame, tile walls
Primer Dry House	1	concrete wall foundation, concrete floor, wood frame, tile walls
<i>Booster Load Line (500 Area)</i>		
Screening and Blending Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Tetryl Pelleting Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Assembly, Packing and Shipping Building	2	concrete wall foundation, concrete floor, wood frame, tile walls
Boiler House	1	concrete pier foundation, concrete floor, concrete tile and steel frame, tile walls
Change House	1	concrete wall foundation, concrete floor, concrete and tile walls; two stories
<i>Detonator Load Line (700 Area)</i>		
Lead Azide and Mercury Fulminate Preparation House	2	concrete pier foundation, concrete floor, wood frame, tile walls
Primer Mix Preparation House	1	concrete wall foundation, concrete floor, wood frame, tile walls
Tetryl Blending Building	1	concrete wall foundation, concrete floor, wood frame, tile walls

Table 3 (cont'd)

Building Name	Number	Notes on Construction
Tetryl Pelleting Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Detonator Loading Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Detonator Rumble Building	3	concrete wall foundation, concrete and lead floor, concrete and tile frame and walls
Final Inspection, Packing, and Shipping Building	1	concrete wall foundation, concrete floor, concrete and tile frame, tile walls
Boiler House	1	concrete wall foundation, concrete floor, concrete tile and steel frame, concrete and tile walls
Change House	2	concrete pier foundation, concrete floor, wood frame, concrete and tile walls
<i>Primer Load Line (800 Area)</i>		
Black Powder Screening House	1	concrete pier foundation, concrete and tile floor, concrete frame, concrete and tile walls
Black Powder Dry House	1	concrete pier foundation, concrete and tile floor, wood frame, tile walls
Primer Loading Building	1	concrete pier foundation, concrete and tile floor with conductive rubber, concrete and tile frame and walls
Primer Preparation Building	1	concrete pier foundation, concrete floor, tile frame and walls
Boiler House	1	concrete pier foundation, concrete floor, steel frame, tile walls
Change House	1	concrete wall foundation, concrete floor, concrete and tile frame and walls
Black Powder Pelleting Building	1	concrete pier foundation, conductive rubber floor, concrete and tile frame and walls
<i>Shell Load Line (900 Area)</i>		
Boiler House	1	concrete pier foundation, concrete floor, steel frame, tile walls
Receiving, Cleaning, and Painting Building	1	concrete pier foundation, concrete floor, wood frame, tile walls
Melt Load Building	1	concrete pier foundation, concrete floor, concrete and wood frame, tile walls
Change House	3	concrete wall foundation, concrete floor, concrete and wood frame, concrete and tile walls
Propellant Charge House	1	concrete wall foundation, concrete floor, concrete and wood frame, concrete walls
Smokeless Powder Service Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Assembly, Packing, and Shipping Building	1	concrete pier foundation, concrete floor, wood frame, tile walls
Drilling and Boostering Building	1	concrete wall foundation, concrete floor, concrete and wood frame, tile walls
Process Storage and Line Office	1	concrete wall foundation, concrete floor, wood frame, tile walls
Screening Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
<i>Bomb Load Line (1000 Area)</i>		
Boiler House	1	concrete wall foundation, concrete floor, steel frame, tile walls
Process Storage Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Receiving and Painting Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Melt Load Building	1	concrete pier foundation, concrete floor, concrete frame, tile walls
Drill, Booster, and Shipping Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Change House	2	concrete pier foundation, concrete floor, concrete and wood frame, tile walls; has a basement
Screening Building	1	concrete pier foundation, concrete floor, concrete and wood frame, concrete and tile walls
Cooling Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
TNT Screening House	1	concrete wall foundation, concrete floor, wood frame, tile walls
<i>Bomb Load Line (1100 Area)</i>		
Process Storage Building	6	concrete wall foundation, concrete floor, wood frame, tile walls

Table 3 (cont'd)

Building Name	Number	Notes on Construction
Receiving and Painting Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Boiler House	1	concrete wall foundation, concrete floor, steel frame, tile walls
Change House	2	concrete pier foundation, concrete floor, concrete and wood frame, tile walls; buildings have basements
Booster Service Building	1	concrete wall foundation, concrete floor, wood frame, tile walls
Melt and Pour Building	1	concrete wall foundation, concrete floor, concrete and steel frame, tile walls; building has three floors
Screening Building	1	concrete wall foundation, concrete floor, concrete and wood frame, concrete and tile walls
Cooling Building	2	concrete pier foundation, concrete floor, concrete and wood frame, concrete and tile walls
TNT Melt Building	1	concrete wall foundation, concrete floor, wood frame, concrete and tile walls
TNT Screening Building	1	concrete pier foundation, concrete floor, wood frame, tile walls
Assembly, Packing, and Shipping Building	1	concrete pier foundation, concrete floor, wood frame, tile walls
<i>Ammonium Nitrate Plant (1200 Area)</i>		
Boiler House	1	concrete pier foundation, concrete floor, steel frame, tile walls
Neutral Liquor Storage Building	1	concrete pier foundation, concrete floor, steel frame, tile walls
Pan House	3	concrete pier foundation, concrete floor, steel frame, tile walls; a large portion of this building had no walls but had an open steel skeleton
Kettle House	3	concrete pier foundation, concrete floor, steel frame, tile walls
<i>Inert Storage Buildings (1400 Area)</i>		
Warehouse, 51' x 416'	19	concrete pier foundation, concrete floor, timber frame, concrete and tile walls
<i>High Explosives Igloos (1500 Area)</i>		
Igloo, 40' x 26'	55	concrete pier foundation; concrete floor, frame, and walls
<i>Smokeless Powder Igloos (1600 Area)</i>		
Igloo, 60' x 26'	24	concrete pier foundation; concrete floor, frame, and walls
<i>Fuze and Booster Storage (1700 Area)</i>		
Igloo, 60' x 26'	20	concrete pier foundation; concrete floor, frame, and walls
<i>Finished Ammunition Storage (1800 Area)</i>		
Warehouse, 51' x 216'	25	concrete pier foundation, concrete floor, tile and masonry frame (may have also had wood framing members), tile walls
Office and Saw Shop	1	mud sills and posts; wood floor, frame, and walls
<i>Finished Ammunition Storage (1900 Area)</i>		
Igloo, 60' x 26'	88	concrete pier foundation; concrete floor, frame, and walls
Office and Saw Shop	1	mud sills and posts; wood floor, frame, and walls
<i>Water Utility Buildings</i>		
Pump Station	2	concrete wall foundation, concrete floor, wood frame and walls
Pump House	1	concrete wall foundation, concrete floor, wood frame, wood walls
Low Lift Pump Station	1	concrete wall foundation, concrete floor, wood frame, tile walls
Filter Building	1	concrete wall foundation, concrete floor, wood and concrete tile frame, concrete and tile walls

Sources: War Department 1942:2-11; War Department ca. 1942:n.p.; War Reconstruction Finance Corporation (WRCF) [ca. 1946]:n.p.

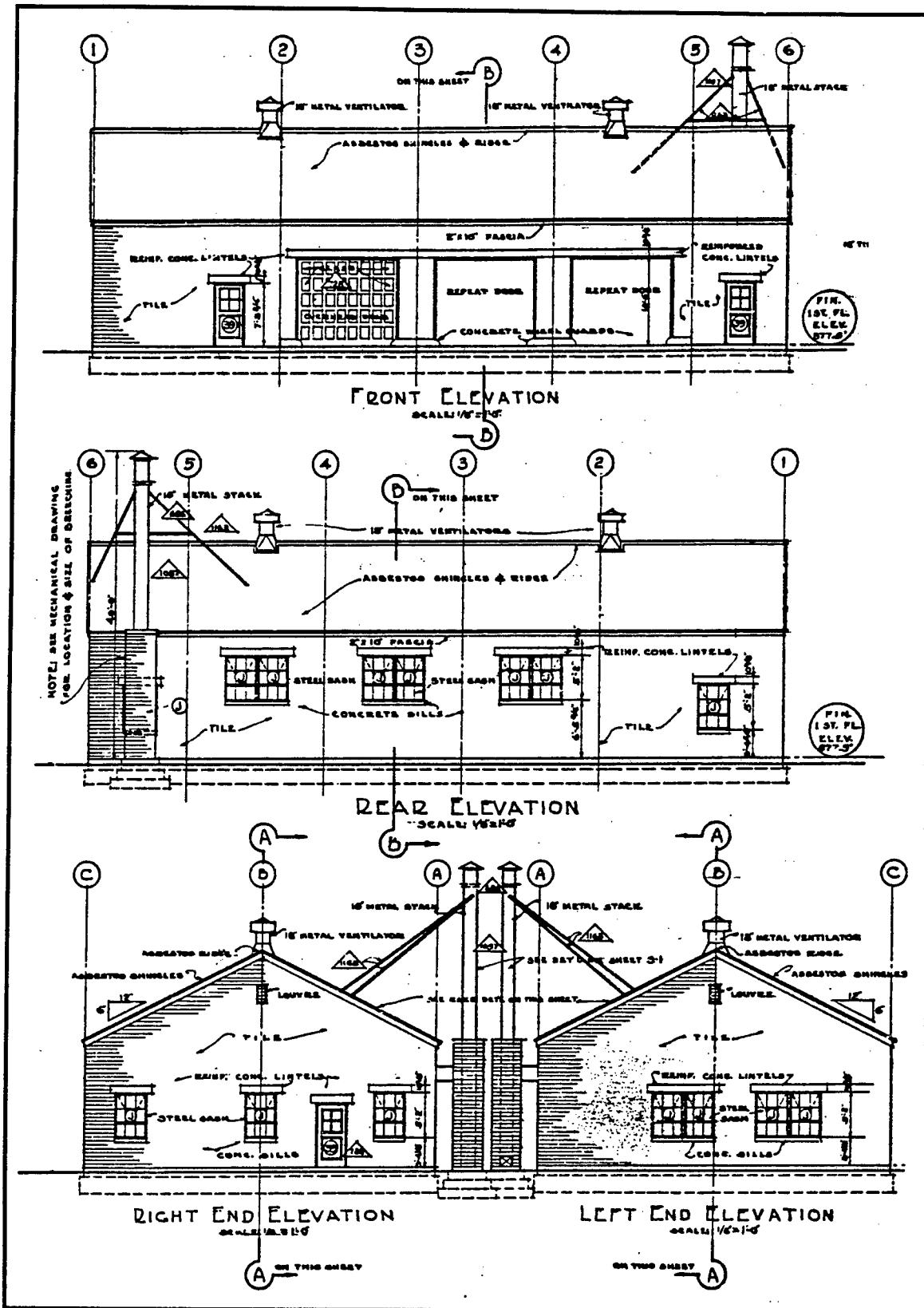


Figure 5. Building 53, one of the two fire stations at KOP (Kansas Ordnance Plant, Drawing 7175-1055, Sheet A-3).

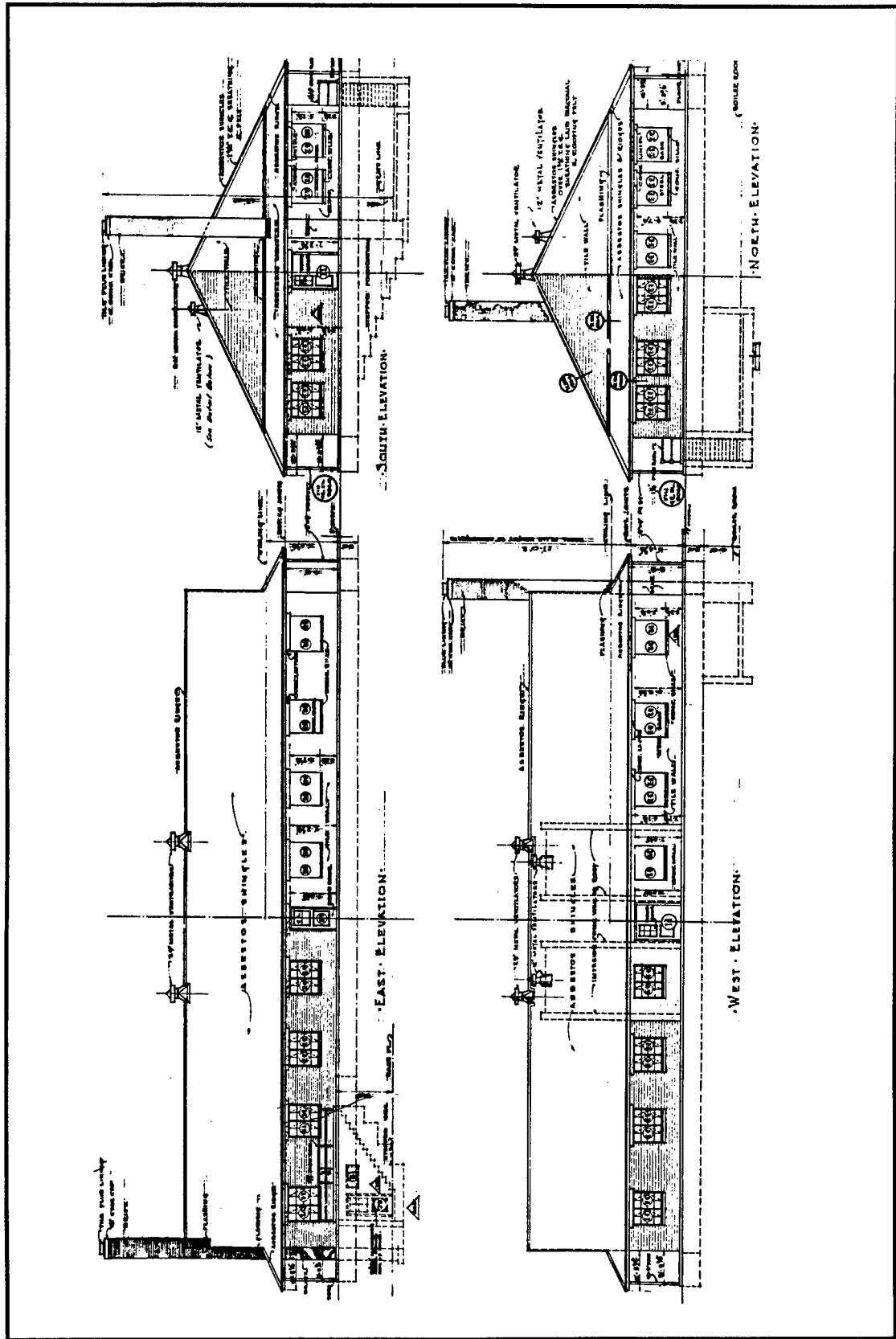


Figure 6. Building 56, the Laboratory Building at KOP (Kansas Ordnance Plant, Drawing 7175-1111, Sheet A-3).

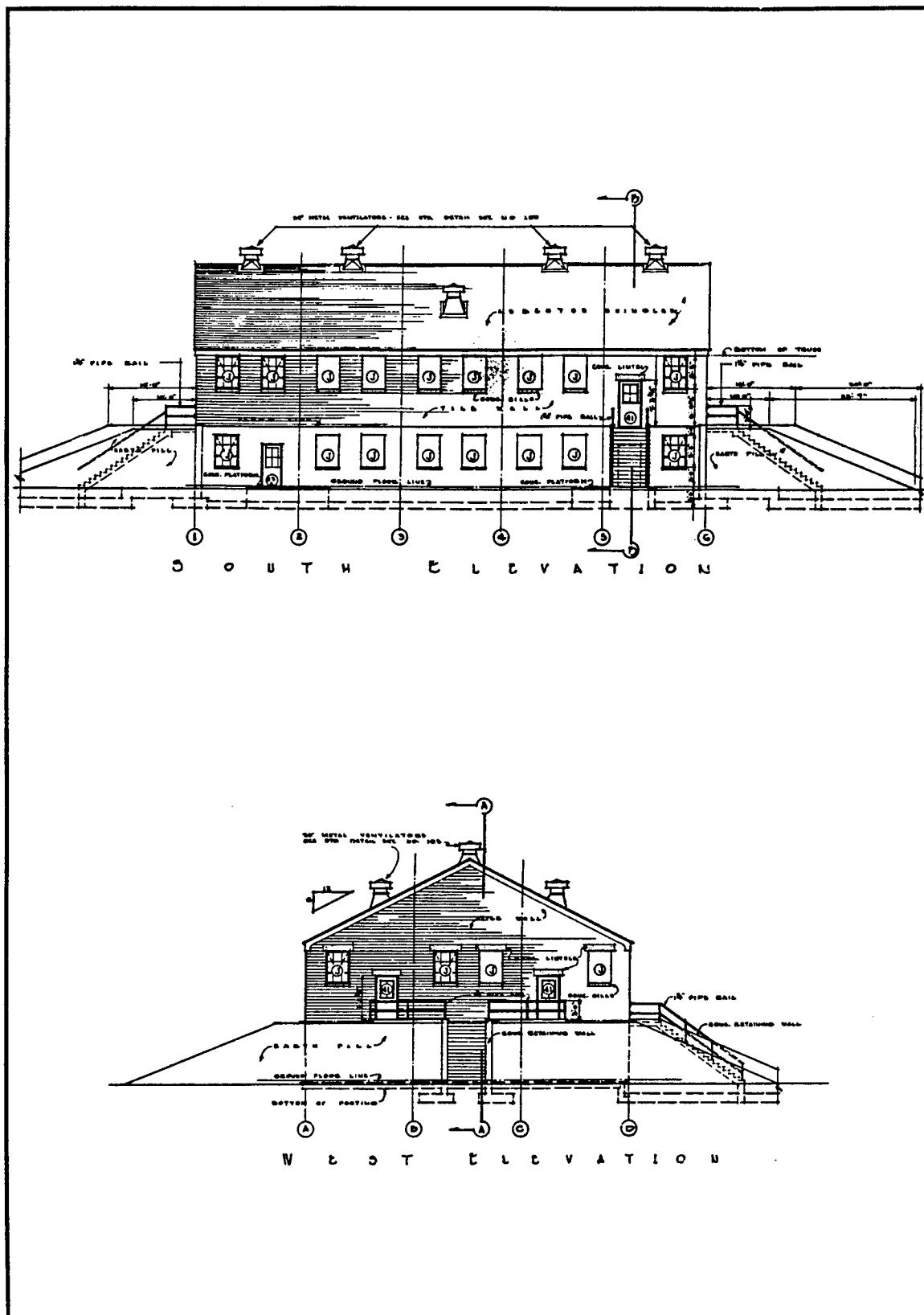


Figure 7. Building 312, the Change House in the 300 Area (Kansas Ordnance Plant, Drawing 7175-1059, Sheet A-3).

had a better than average background of Picatinny Arsenal experience on which to base the layout and equipment" (KOP [1942]:34).

The Detonator Load Line (700 Area) was required to be able to produce 200,000 detonators each 24-hour day. "By direction of the Chief of Ordnance this line was designed closely after the Arkansas Ordnance Plant layout and included the Hercules tube drying method of preparation of lead azide and fulminate" (KOP [1942]:39).

CTQB&C took the design of the Primer Load Line (800 Area) directly from Picatinny typicals (KOP [1942]:44). The operations contract stated that KOP needed to be able to load 50,000 100-grain primers or their equivalent each 24 hours. "This rate can easily be met by the line equipment [as per the Picatinny drawings]" (KOP [1942]:44), but improvements in the layout of the buildings were suggested. The "chief recommendation is that the body and head preparation and loading be done in one building and that building be designed to fit the modern equipment [which the operator was planning to install or had already installed]. This would cut considerably the cost of original construction of the primer line and the cost of handling operations, especially if adequate inert storage space was provided in that building" (KOP [1942]:45).

The design of the 900 Area was based on "the Picatinny Arsenal Typical Plant 1A⁹ for a contract operating capacity of 24,000 105mm Howitzer Shell per 24 hour day or equivalent capacity of similar shell (40,000 75mm Howitzer Shell per 24 hour day is equivalent). It was seen from the time of earliest operation that this rate capacity was underestimated" (KOP [1942]:46). The Melt Load Building, one of the main structures, is shown in Figure 8. The main problem with the design was that it required large quantities of components and explosives to be delivered to nine different points of usage along the production line. The organization was also awkward. More warehouse space within the production area would have helped alleviate "excessive double handling of incoming materials" (KOP [1942]:46-47).

The 155-mm Shell Load Line (1000 Area) "was designed and constructed for a contract capacity of 8400 155mm shell [sic] per 24 hour day or an equivalent number of similar HE [high explosive] shell" (KOP [1942]:37). Although it is not known for certain that typical drawings were used by the architect-engineers for the design of this building, they were likely used. This line was also called the Group II Line, a designation that probably comes from Picatinny drawings. The KOP 900 Area was sometimes referred to as the Group I Line, and the Picatinny drawings it was based on was called a Typical Plant IA; likewise, the line in the 1100 Area was sometimes called the Group III Line at KOP, and similar lines at other facilities were also referred to as Line or Group III or IIIA (see below). Thus it can be inferred that the design of the 1000 Area and its structures were based on Picatinny typicals.

The Bomb Load Line (1100 Area) was designed to load bombs ranging from 100 to 6,000 pounds "and followed closely the Picatinny Arsenal typical plan entitled III A. Contract planned capacity was 2,880 100# bombs, or equivalent capacity for other similar types, per 24 hour day" (KOP [1942]:28). Other lines similar in design to the KOP "Group III" line were built at the Elwood Ordnance Plant (now part of Joliet Army Ammunition Plant) and the Iowa Ordnance Plant (now Iowa Army Ammunition Plant), which refer to these lines as Group IIIA and Line IIIA, respectively (Gaither 1994:49).

The last production area, the Ammonium Nitrate Plant (1200 Area) "was built with only minor changes from the plans used by the Ravenna Ordnance Plant. Most of these changes were the result of contacting the original designer who by then had a plant in operation" (KOP [1942]:31).

⁹ This line was also called the Group 1 Line, which is probably a reference to the typical from which its design was derived.

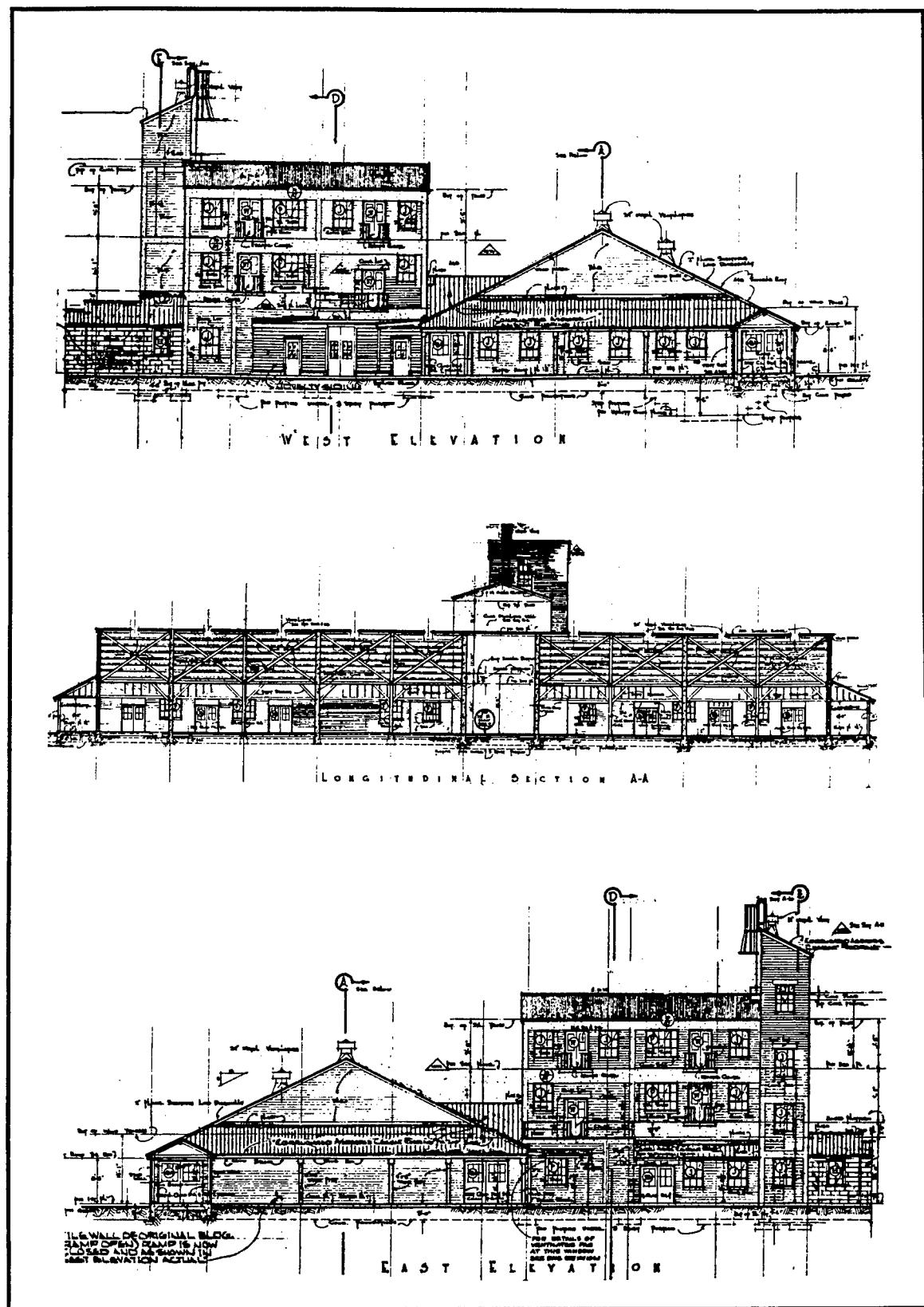


Figure 8. Building 905, the Melt Load Building in the 900 Area (Kansas Ordnance Plant, Drawing 7175-722, Sheet A-6).

The structures that housed production at KOP, which involved the loading, assembling, and packing of shells, bombs, and their components, can be described as a whole, as was done by the Historic American Building Survey/Historic American Engineering Record when the structures at KOP were recorded. The production buildings were in general

long and narrow with gable roofs, . . . built of structural clay tile with doors and windows at regular intervals. Architectural variations of the LAP buildings are related to their function. The load and assemble areas within these buildings are often divided by concrete partition walls which protrude through the roof to prevent the spread of fire or explosion. . . . For those buildings used as packing houses, loading platforms and sliding doors replace the standard double doors found in the load and assemble areas. Like their exterior design, LAP buildings have four standard interior arrangements: 1) buildings with no partition walls, 2) buildings with a single partition wall at one end of the building, 3) buildings with concrete partitions walls at regular intervals which protrude through the roof, [Figure 9] and 4) those with partitions which do not protrude through the roof. In addition to the very long, narrow LAP buildings, a few smaller buildings serving the same functions are located [in] the 700 and 800 areas. These buildings have thick concrete partition walls which protrude above the roof and are meant to isolate and direct an explosion (Historic American Buildings Survey/Historic American Engineering Record [HABS/HAER] 1984:17-19).

Standardized drawings were used for designing both production-area structures discussed above and structures in nonproduction areas. The design of most buildings in the Administration Area, for example, were probably based on the 700 or 800 Series Temporary Mobilization drawings developed by the Office of the Quartermaster General. Plans for the precursor of these, the Series 600 buildings, were first drawn in 1917 (Wasch and Bush n.d.:3), then modified over the two decades that followed. Major Elsmere J. Walters, then Advisory Architect of the Construction Division of the Quartermaster Corps, drew up finalized versions of the Series 700 between 1937 and 1940 (Garner 1993:33)¹⁰. These buildings were similar to World War I structures, the primary outward difference being that the World War II buildings were painted instead of being left to weather, as were buildings in the previous war. The interiors of these buildings at some locations were left unpainted throughout the war, and exterior walls at most locations were neither insulated nor sheathed (Garner 1993:35). Architectural standards in the Series 700 buildings were upgraded considerably over those of the Series 600 drawings. Stud construction replaced plank frame construction and concrete piers and footings replaced treated-timber posts. These attributes are found in the buildings at KOP. But,

a distinctive feature peculiar to Series 700 buildings was a skirt-roof that projected from the spandrel wall above the ground-story windows on two-story buildings, and continued around all four sides. On both the single-story and two-story buildings, it also extended the eave line beneath the front and rear gables to span the width of the building. Other terms used to describe this skirt-roof were 'canopies' and 'eyebrows.' The official term used by the army to designate this feature is 'aquamedia,' [or aqua media] and its origin is as uncertain as its Latin derivation. Whatever its ontology, aquamedia was of questionable value (Garner 1993:41).

¹⁰ There is another version of how these plans came about. Brigadier General Charles D. Hartman did the original work on the Series 700 drawings in the 1930s, then left for an assignment in California. In this alternate version, when he returned to Washington in March 1940 to head the Construction Division of the Office of the Quartermaster General, he found that "in his absence, someone [Major Walters?] had markedly altered the plans, changing them so they could no longer be used. Furthermore, the remainder of the plans had disappeared" (Wasch and Bush n.d.:11). Hartman's response was to set up a Construction Advisory Committee and include prominent U.S. architects and engineers. "With this sort of leadership, the engineers and architects at the Ft. Myers warehouse cum design studio were able to deliver the drawings—the latest, revised version of the 700 Series—on time" (Wasch and Bush n.d.:12).

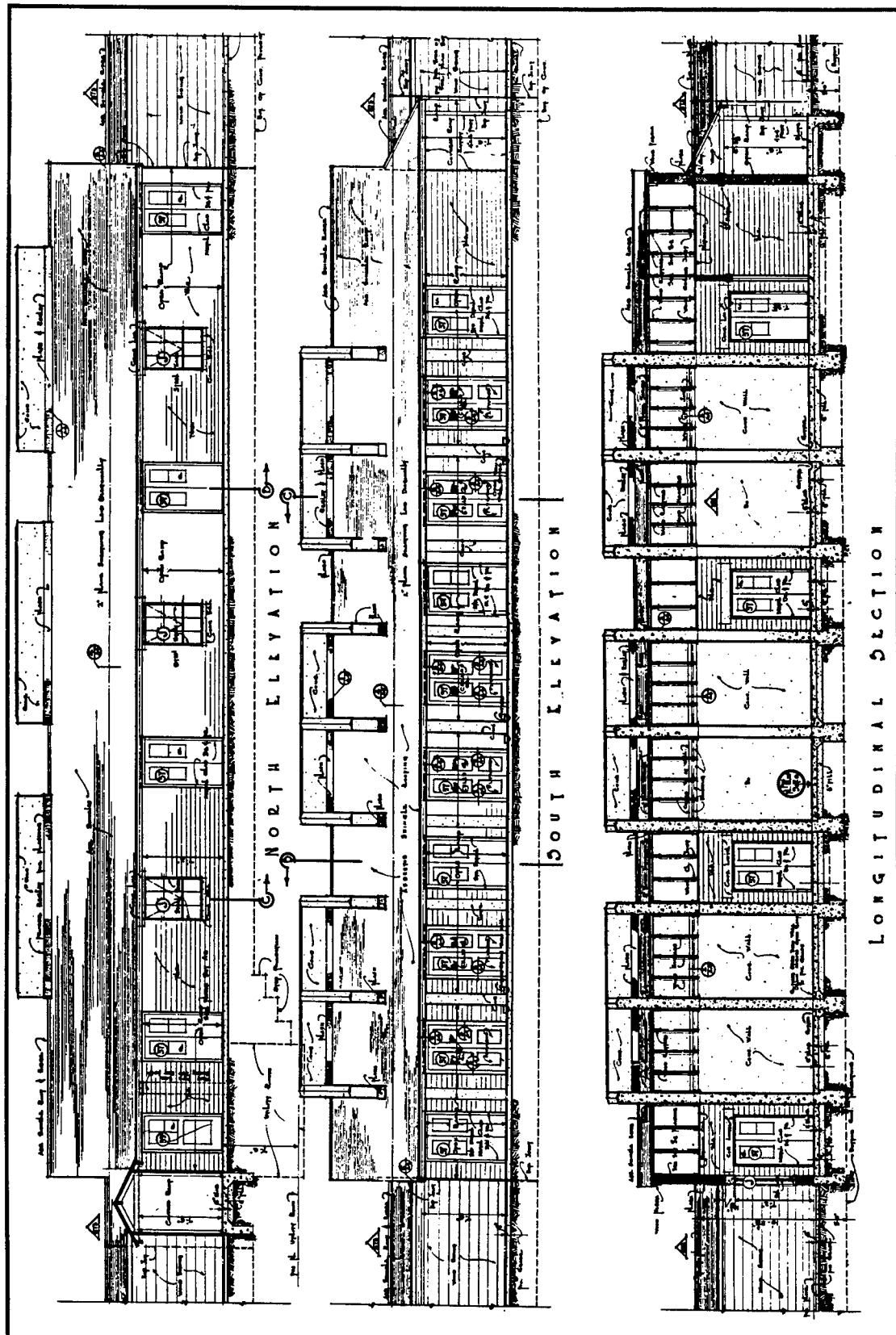


Figure 9. Building 714, the Tetryl Pelleting Building in the 700 Area, showing concrete partitions that extend through the roof (Kansas Ordnance Plant, Drawing 7175-663, Sheet A-3).

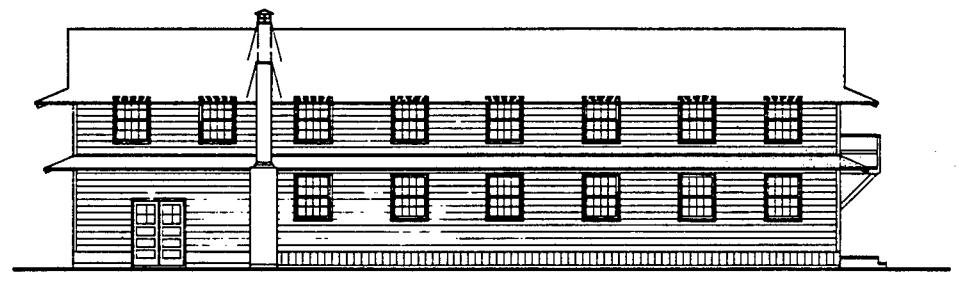
Meant to allow windows to remain open for ventilation while it was raining, the feature (Figure 10) was dropped from Series 800 buildings (Figure 11) because it was largely ineffective against blowing rain, and leaks occurred where the rafters for the eaves were framed into the wall (Garner 1993:33-41). It was also dropped on some Series 700 drawings, which were being revised during 1940 and 1941 (Wasch and Bush n.d.:37-39). At the time KOP was designed, both 700 and 800 series drawings were being used by architect-engineers working on mobilization projects (Wasch and Bush n.d.:44-45), so either or both may have been consulted by CTQB&C. Judging by the aqua media feature, most buildings at the facility resemble structures in the 800 Series more than the 700 Series (Figure 12).

All of the dormitories (Figure 13) were prefabricated structures, assembled in sections. "The design of the dormitories at the Texarkana Plant [probably the Lone Star Ordnance Plant] was followed in the construction of our dormitories. . . . Shower baths are provided in men's dormitories and both shower and tub facilities in women's dormitories" (KOP [1945]:53). The design of the Cafeteria (Building 103) was based on a cafeteria at the Elwood Ordnance Plant (now part of the Joliet Army Ammunition Plant). It was built in the shape of a "T" and could seat 525. Hardwood flooring was used in the dining area and a cement floor in the kitchen (KOP [1945]:44). The staff houses (Figure 14) were also prefabricated, but not by the construction crews at KOP. Those buildings were designed and built by the Southern Mill and Manufacturing Company, of Tulsa, Oklahoma (Southern Mill and Manufacturing 1942). Each had two or three bedrooms and was "of the most modern design, beautifully decorated, with large built-ins in the kitchen. Each has an automatic electric hot water heater, electric refrigerator and electric range. The homes are equipped with oil burning heaters which circulate the warmed air through out [sic] the rooms" (VOX KOP 1942a:1).

KOP also had its own water and sewage disposal systems. The original estimate was that the facility would need 800,000 gallons of potable and process water per day provided by an onsite well system. The plan had to be abandoned because the first well revealed high levels of hardness and salinity (KOP [1942]:15, 63). The well was made operational, but only for emergency use. It could provide about a million gallons of water per day, primarily needed in case of fire. (Two impoundments, Quarry Pond and Lyons Pond, each of which stored approximately 4.5 million gallons of water, built before the government bought the property, were also available for emergency use.) Instead of a well system, a small concrete spillway dam, eight feet high and 195 feet long and capable of storing approximately 150 million gallons of water, was built across the Neosho River to the east of the plant, with a pumping and filtration plant nearby (KOP [1942]:15, 63-64; War Department 1942:10). The filtration plant included "mixing chambers, settling basins, sand gravel filters," and a filtered-water reservoir with a capacity of a million gallons (War Department 1942:10). The water was tested every two hours to determine mineral content; alum, lime, and carbon were added as needed, along with chlorine (VOX KOP 1942e:8-9). The sewage disposal plant, designed to be adequate for a population of approximately 10,000, was a standard trickling-filter type facility with a capacity of one million gallons per day (War Department 1942:10).

To speed construction, not only were individual buildings developed from standardized plans, but component parts were also standardized.

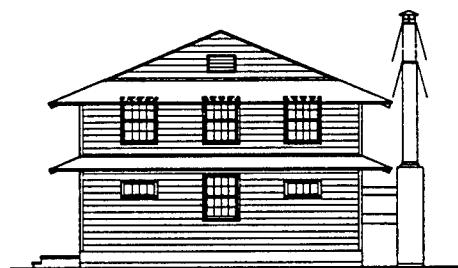
Standard specifications were employed for masonry, carpenter's work and roofing to name a few. Hardware, sash and doors were also standardized. In addition, similar building materials were utilized throughout the plant—concrete slab foundations, asbestos shingle roofing, hollow clay tile walls for industrial buildings and novelty wood siding for support facilities. Since steel was at a premium during this period, wood 2 x 4's were bolted together to form trusses. The standard truss width, 51'5", in turn standardized the width of the buildings in which it was employed. In addition, prefabricated sections of walls, doors and roofs were brought to the construction area allowing a building time of three days (HABS/HAER 1984:16-17).



SIDE ELEVATION



FRONT ELEVATION



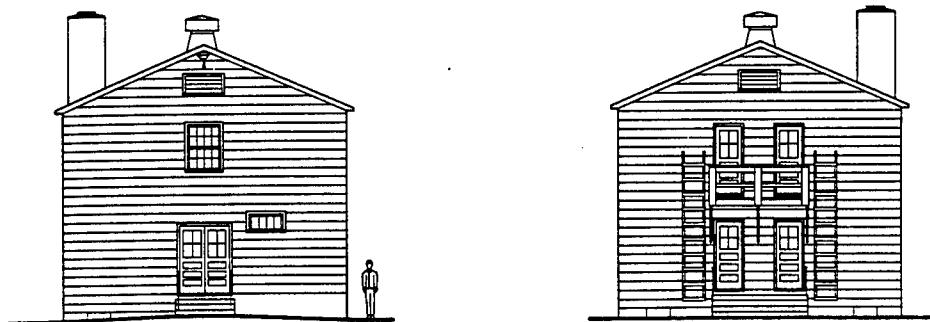
REAR ELEVATION

74 & 63 MEN BARRACKS - 700 SERIES

0 5 10 15 20 25 FEET

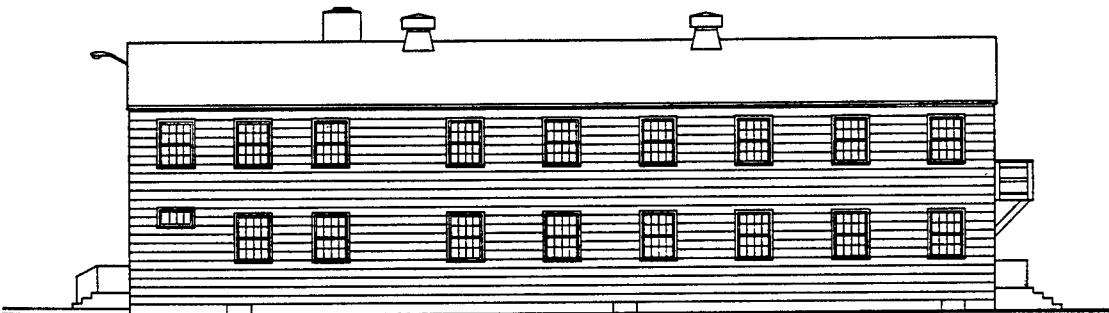
METERS 0 1 2 3 4 5

Figure 10. Example of a Series 700 Temporary Mobilization Building, showing the aqua media feature (Wasch and Bush n.d.:34).



FRONT ELEVATION

REAR ELEVATION



SIDE ELEVATION

Figure 11. Example of a Series 800 Temporary Mobilization Building (Wasch and Bush n.d.:43).

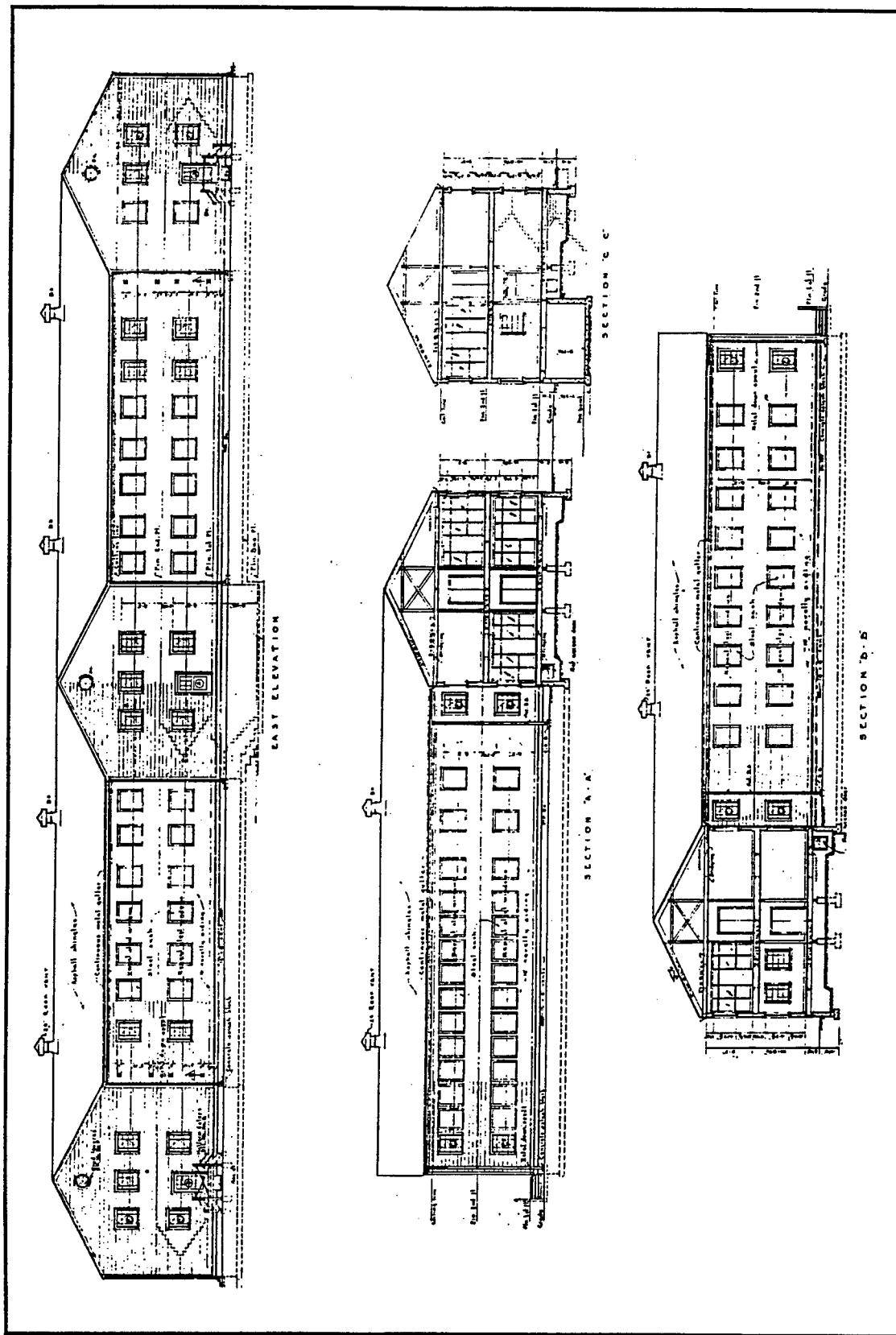


Figure 12. Building 102, the Administration Building at KOP. Lack of the aqua media feature may indicate a Series 800 design (Kansas Ordnance Plant, Drawing 7175-142, Sheet A-7).

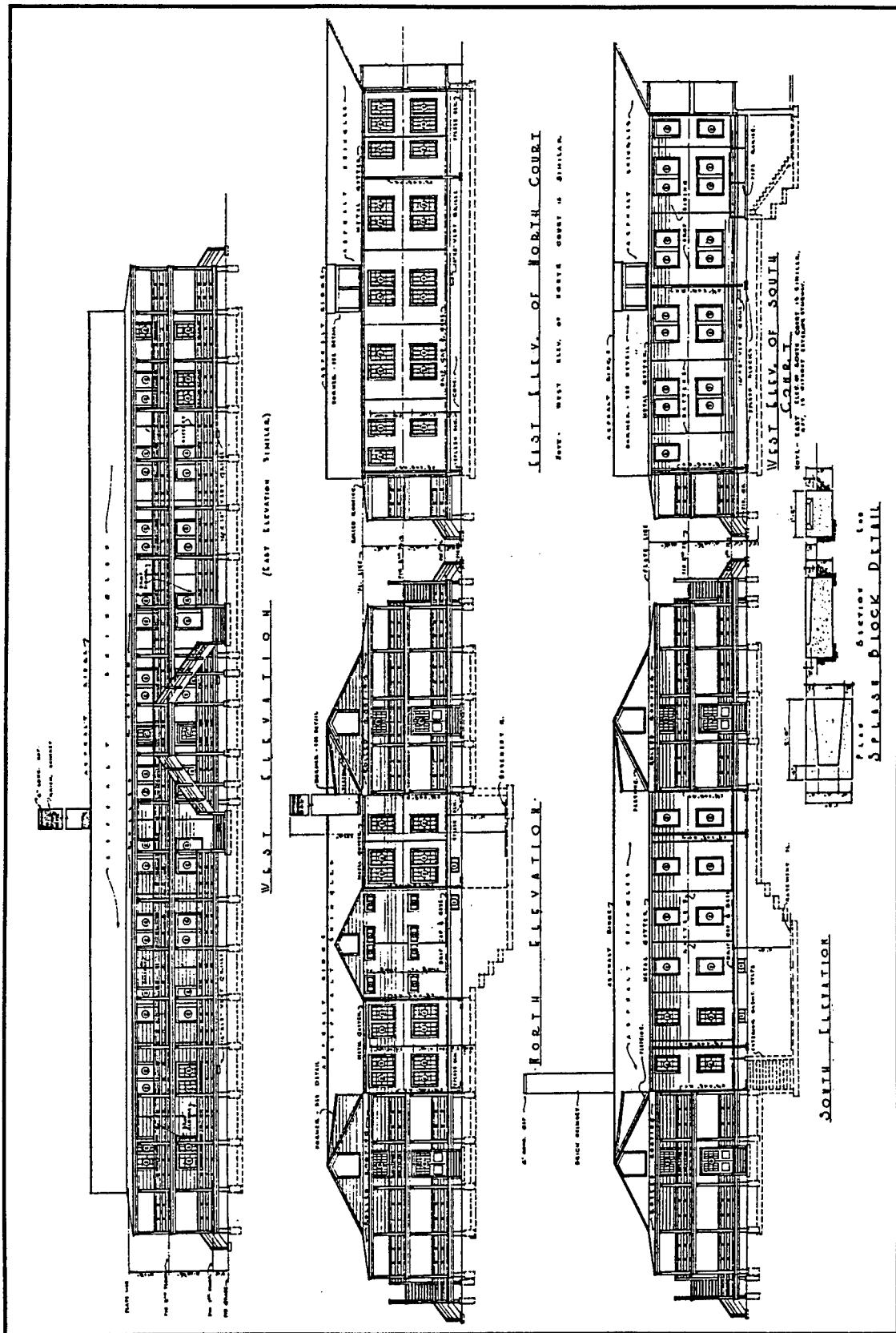


Figure 13. The eight dormitories at KOP were all prefabricated and assembled in sections (Kansas Ordnance Plant, Drawing 7175-1884, Sheet A-4).

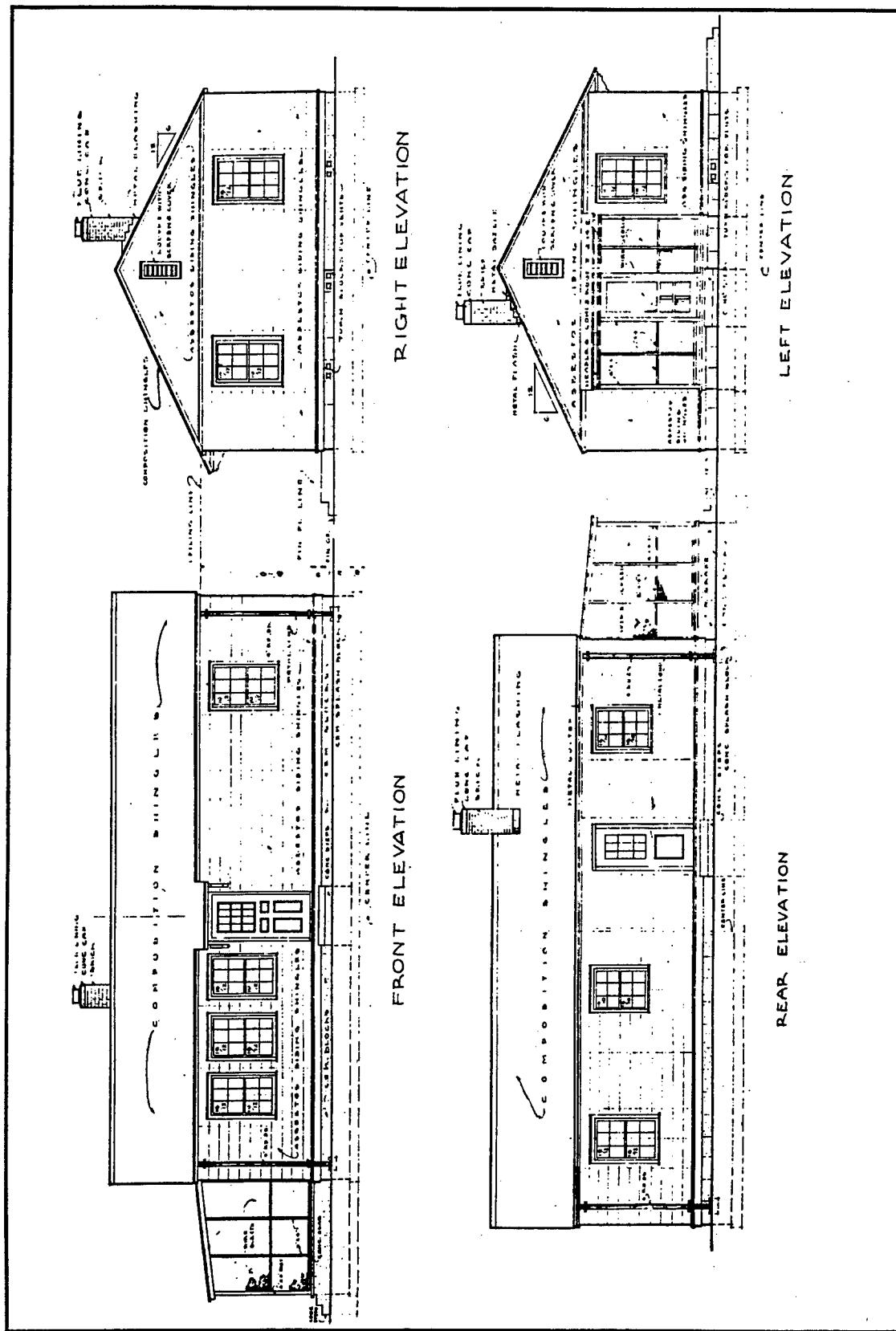


Figure 14. The 20 staff houses at KOP were all prefabricated structures, built by Southern Mill and Manufacturing, Tulsa, Oklahoma (Kansas Ordnance Plant, Drawing 7175-1871, Sheet A-1).

As mentioned above, part of the standardization effort consisted of using plans from other facilities. Where possible, the same design was also used for several buildings. Examples include change houses, sentry stations, boiler plants, and vacuum houses (HABS/HAER 1984:17).

Problems with the Design—Outdated Standards

The prevailing thought among industrial architects at the beginning of the twentieth century was that factory structures should be functional, and the more purely functional they were the more “honest” was the design. Functionalism went beyond merely the elimination of all ornament, of all things that were thought not absolutely necessary to house the processes within the building, and those processes themselves became the primary consideration for the design. And this was true of GOCO projects as well. For example, in its design of the manufacturing buildings at Twin Cities Ordnance Plant, Smith, Hinchman and Grylls “used large tables to layout [sic] the machinery to scale, then wrap[ped] the translucent ‘skin’ of the buildings around the industrial process” (Murphey 1993:6).

In contrast, the manufacturing buildings at KOP were not designed around equipment; or rather, the equipment they were originally designed to accommodate was outdated by 1941.

For example, one of the production executives wrote that it was ‘quite apparent’ that in ammunition loading techniques the Ordnance Department had not kept itself up to date, . . . proved by the fact that private industry by 31 December 1942 had developed new machinery and improved production layouts. He stated that the Ordnance Department did not even know the production capacity of a given ammunition loading line; that it had failed to avail itself of automatic machinery. In substantiation of the latter, he wrote that in 1942 the same process for pouring 155mm shell with tub and bucket which had been employed in the first World War was still in use (Voight 1945:162).

So new equipment had to be fit to buildings that, in at least some cases, had been designed to house World War I-era equipment. These structures were much less suitable for the increasingly automated techniques that had become available since that war. The use of typical or standard building designs may have resulted in less time spent in the drafting rooms, but documentation from KOP shows that there were problems with designing facilities in this way, as well as with using agent-operators who knew little about the type of manufacturing they would be doing.

The reverse program [that is, making equipment fit the buildings rather than the buildings fit the equipment] had to be followed in this development, and construction and building thereby often preceded the equipment plan, and procurement then had to be made on the basis of the building. This was because there was so little information available on the actual operations and their rates of performance and the suggested equipment for doing most of the jobs was many years behind the methods that would have been used by 1940 industry to achieve similar results (KOP [1942]:67).

Greater production efficiency may have been achieved by not requiring the architect-engineers to follow typicals. After all, the agent-operators were encouraged to manufacture their products efficiently since they were paid by the piece—the fixed fee of a CPFF operations contract was a set amount per unit of production. However, the drive for efficient production, carried as it was to even the design of individual structures, may have been hampered by the requirement that the architect-engineers stick closely to the plans they were provided with as typicals.

This was reiterated again at the end of the same 1942 history of the facility in a few pages that are more of an indictment of the ANMB than of the architect-engineers. In a commentary, the chief of the Operations and Engineering Division of JMS made several recommendations for future interwar planning, some of which were among the objectives of the ANMB and the goals of the industrial mobilization plans of the 1930s. The

suggestions included not designing buildings until after equipment layouts had been planned. Or, in case of limited monetary and personnel resources, keeping only up-to-date equipment layouts—later, architect-engineers could quickly design new buildings around those layouts.

The author also suggested that a board be formed, slightly different from the ANMB (which was not mentioned), with members being Ordnance Department personnel or “representatives of ten successful industrial companies selected by the Chief of Ordnance” and serving five-year terms. Separate boards were proposed for LAP undertakings, component manufacture, and explosives production—like the roles of the six old-line arsenals during the interwar years. The commentary ended with an explanation of what prompted it. “The suggestion of a Plant Plan Board is presented as a practical means of providing further insurance against expansion without up-to-date knowledge of equipment or methods of production; expansion of which was at first sluggish by duplication, for lack of planned standards or a clear cut line of action” (KOP [1942]:125-126). This was precisely the goal of the ANMB and interwar planning.

Architectural and Design Significance of Structures at KOP

Since much of KOP was built from architectural plans that served as standards for at least some, and very likely many, other World War II-era industrial facilities, there is little architecturally significant about the facility. Like other plants of the period, the facility’s “cohesive visual image and historic landscape are characterized by standardized building designs, structural types, and a sprawling functional site plan. KAAP is not exceptionally unusual or unique among army installations of its period in its architectural integrity” (HABS/HAER 1984:19).

One point that may set this facility apart from other GOCO industrial facilities was discovered in the course of research. The igloos in the 1500 and 1600 areas still employ loading docks, or aprons, which may be somewhat unique because they were built lower than usual, requiring special ammunition carriers, which had to have a tailgate lift to off- or on-load ammunition (George Eisiminger, personal communication 1995). The aprons are not part of the actual igloo, and may not have been part of the original design. They are not shown on CTQB&C’s igloo drawings. The special ammunition carriers used now are called low-boy loaders or haulers, and those used during World War II were called carryalls or powder wagons (*Parsons Sun* [PS] 1944c). Receiving buildings on the lines were built with similar aprons for consistency, so applicable buildings in the 300, 700, 800, 900, 1000, and 1100 areas are all similar (Ralph Knape, personal communication 1995). Only one possible reference to this feature was found in the historical record. It refers to the 900 Area—“the direct car loading dock was put in use during April of this period [April-June 1945]. The dock saved an undetermined amount of money, transportation, equipment was nearly expended and could not be replaced, the same could be said of man-power [sic]. Our only criticism was in the spring of 1942 we came back from a training program at Ravenna Ordnance Plant, Ravenna, Ohio, where direct car loading was used. We of supervision suggested that Line I (then under construction) be equipped with a dock” (KOP [1945]:203). This last statement implies that the line in the 900 Area or all lines had no docks as originally constructed.

The Efficacy of the Architect-Engineers

The documents written by JMS personnel, who seem to have been encouraged to be critical of all aspects of the facility in order to improve both this and future efforts of military-industrial mobilization, revealed there were many shortcomings in the design of the facility, but did not attribute these to work of the architect-engineer. They did note that the work of CTQB&C came in below cost “in spite of the fact that work was added to that originally contemplated” (KOP [1942]:n.p.). Ordnance personnel explained their efficacy more fully.

The Architect Engineer; Consoer, Townsend and Quinlan Battey & Childs demonstrated outstanding ability in the organization of their forces and displaying [sic] unusual capability in the design and engineering phase of [the] construction program. The Architect Engineers were somewhat handicapped in the early stages because of changes and additional requirements. However, promptness in the execution of the required work was displayed and efficiency and resourcefulness was strived for as a prime factor (War Department 1942:20).

Construction of the Facility

In June 1940, when the first defense construction funds became available, a dispute "between the Quartermaster Corps and the Ordnance Division as to who should have supervision over the building of plants" arose, the impetus of the conflict being the construction of the Indiana Ordnance Works (Fine and Remington 1972:185). Then Chief of Ordnance Major General Charles M. Wesson had negotiated an agreement with E.I. du Pont de Nemours & Company "for the design, construction, and operation of the plant" without consulting Brigadier General Charles D. Hartman, who headed the newly created Construction Advisory Committee (Fine and Remington 1972:186). This was in direct contradiction to the Defense Act of 1920, which took construction away from the Construction Division of the Army and handed it over to the Quartermaster Corps (Fine and Remington 1972:38-39). Ordnance officers favored a construction arrangement in which the agency that would run the plants would also design and build them (Fine and Remington 1972:186). The Quartermaster Corps favored a divided responsibility, which would share the wealth of defense contracts. In support of such a position, one Southern congressman complained that the War Department seemed "to take care of the big people, mak[ing] the big still bigger, . . . leav[ing] the little people struggling to get along out in the cold" (Fine and Remington 1972:190).

Ordnance officer Colonel James H. Burns tried to resolve the difference in positions by outlining a procedure under which the branch of the service using the facility would name firms to operate the plants and act as "management agents" during construction while Hartman would choose building contractors "in consultation with and subject to the concurrence of the interested service" (Fine and Remington 1972:186). Assistant Secretary of War Louis A. Johnson approved the procedure on 11 July 1940, but six days later Wesson defied compliance by signing an agreement with Du Pont covering the design, construction, and operation of the Indiana plant. By the end of July, however, Wesson agreed to follow the procedure outlined by Burns, making the Indiana facility the only World War II-era munitions project for which a single contractor was solely responsible for all aspects of construction and operation of a plant.

It can be supposed that at least the appearance of spreading the wealth was part of the reason the construction contract at KOP was awarded to three firms: Peter Kiewit Sons' Co. and George W. Condon & Co., both of Omaha, Nebraska; and Paschen Construction, Inc., of Chicago. The work was awarded under the same CPFF contract that awarded operations to JMS (Contract W-ORD-518 DA-W-ORD-5). The construction cost was estimated at \$24,532,563 (HABS/HAER 1984:16; War Department 1942:Field Progress Report, Part D). Such a coalition was probably just what the Quartermaster Corps was hoping to find—the three together were large enough to handle logistical requirements concerning the gathering of labor, equipment, and materials, yet they were three different entities, separated geographically and located outside the area that would benefit from smaller locally-awarded subcontract work and operations. There seem to have been, however, only three major subcontracts awarded, going to U.S. Engineering Company, Evans Electric Company, and Jacobson Plumbing Company (KOP [1942]:12). Other subcontracts went to the Southern Mill and Manufacturing, Tulsa, Oklahoma, who built the staff houses (KOP [1942]:10); and the Kansas Gas and Electric Company, who set up the electrical system to the step-down transformers at KOP's substation (KOP [1942]:64).

A joint venture between two or more construction companies was and still is common practice in undertaking large projects like the construction of KOP. One company serves as the managing partner, essentially

running the job, while the others help locate and supply labor and working capital. Peter Kiewit Sons' most likely served as the managing partner, alternatively called the general sponsor, for this construction project (Gaither 1995:69; Maher, personal communication 1995). Of the three contracting partners, two still exist—Peter Kiewit Sons' and Paschen Construction, now Paschen Contractors, Inc. They and their third partner began the construction of KOP on 18 August 1941 (*KAAPSULE* 1971:1). It would be completed in just over a year, despite extreme difficulties due to one of the wettest seasons on record for southeastern Kansas.

The Managing Partner of the Construction Contractors

Peter Kiewit Sons', Inc., can trace its beginnings to its namesake, the son of Dutch immigrants who settled in Iowa. In 1884, Kiewit opened a masonry business in Omaha, and changed the firm name to Peter Kiewit & Sons when sons George and Ralph joined the business in 1912. The company had by then expanded its services, becoming a general contractor in the Omaha area. Two years later, the elder Kiewit died; George and Ralph continued to operate the business under the name of Peter Kiewit's Sons.

Another Kiewit son, also named Peter, left university to join the company in 1920. He began as a foreman, but within a few years he was placed in charge of overseeing entire projects. He also won the contract for the company's first million-dollar project, the construction of the Livestock Exchange Building in Omaha. But rather than indicating a bright future for the company, the project was almost the high point at the end of its history. Family members began pulling out of the company during the 1920s, and in 1930 Peter Kiewit was diagnosed as having phlebitis. He was told he would be semi-invalid for the remainder of his life. Instead, within a few months of his release from the hospital, Peter started a new company, called Peter Kiewit Sons'. And it was this company which managed the construction of KOP.

Kiewit gambled with his new company and moved into heavy construction, his first project a contract to build roads in Texas. Although not successful as a business venture, the project gave Kiewit experience he would use to great advantage during the era of the New Deal public works projects and the increased, federally supported construction.

By 1940, although the company was working on projects in at least seven states, Peter Kiewit Sons' was still considered a small company. But the enterprise was able to take full advantage of the construction boom spawned by World War II and grow dramatically. The eight-million-dollar contract for the construction of the cantonments at Fort Lewis, Washington, was its first major war construction project. Other war contracts included the construction of Camp Carson, Colorado, and various military installations in Alaska. In all, the company's World War II-era projects were valued at over \$500 million, and it was this work that placed the company among the nations largest construction contractors (Derdak 1988b:422-423).

Construction Gets Underway

The first priority during construction was reported to have been given to the Bomb Load Line (1100 Area), the first manufacturing area to be completed, then to the four component lines, and next to the two remaining load lines (KOP [1942]:21)—although the first area to go into construction was the Administration Area (Table 4). The first buildings were likely temporary structures to house equipment (Figure 15) and offices¹¹ to house the architect-engineers, Ordnance personnel, and the construction overseers, one of which was a “temporary pine-and-tarpaper structure” called the Administration Annex, or simply “the Barn” (*KAAPSULE*

¹¹ The general layout of the facility was not approved by the Chief of Ordnance until 3 September (KOP [1942]:1), so any construction prior to that date would probably have been considered temporary.

Table 4
Length of Construction by Functional Area at Kansas Ordnance Plant

Area Name	Area	Date Begun	Date Completed
Miscellaneous Buildings	—	5 January 1942	4 May 1942
Administration Area	100 Area	18 August 1941	31 August 1942
Maintenance Area	200 Area	17 January 1942	1 August 1942
Fuze Load Line	300 Area	13 December 1941	10 August 1942
Booster Load Line	500 Area	6 December 1941	22 April 1942
Detonator Load Line	700 Area	13 December 1941	6 June 1942
Primer Load Line	800 Area	16 January 1942	24 June 1942
Shell Load Line	900 Area	20 January 1942	6 July 1942
Bomb Load Line	1000 Area	2 January 1942	23 June 1942
Demolition Bomb Load Line	1100 Area	5 November 1941	30 March 1942
Ammonium Nitrate Plant	1200 Area	6 December 1941	2 May 1942
Railroads and Classification Yard	1300 Area	18 September 1941	22 May 1942
Inert Storage Buildings	1400 Area	8 November 1941	23 March 1942
High Explosive Storage	1500 Area	22 November 1941	5 May 1942
Smokeless Powder Storage	1600 Area	25 October 1941	31 March 1942
Fuze and Booster Igloos	1700 Area	17 January 1942	23 March 1942
Finished Ammunition Buildings	1800 Area	17 January 1942	22 May 1942
Finished Ammunition Igloos	1900 Area	20 December 1941	15 May 1942
Water System	2100 Area	30 October 1941	30 July 1942
Sewer System	2200 Area	8 November 1941	29 April 1942
Roads and Parking Areas	2300 Area	18 October 1941	11 May 1942
Electrical System	2400 Area	25 October 1941	15 May 1942

Sources: War Department 1942:2-9, 18-19

1971:2). When this building was torn down in the first weeks of September 1942, Building 113, earlier the Guard Barracks, became the Administration Annex (*KAAPSULE* 1971:2). The other temporary structures likely met similar fates.

Uncooperative Weather and Other Problems

Construction proceeded steadily throughout the year-long project, running slightly ahead of schedule most of the time (Figure 16). This was in spite of a period of extremely heavy rainfall during September, October, and November 1941 (KOP [1942]:14) "Rainfall of 9.36 in. in September and 13.77 in. in October, 1941, made ground conditions so bad that construction was nearly impossible" (War Department 1942:20). The muddy conditions caused by the combination of the amount of rain and the removal of vegetation during grading were a constant problem at the site. In late December, the supervisor of the Inert Storage Area (Figure 17) described the terrain there a month and a half after the rains had subsided: "At this time our Inert Storage office was [a] constructor's [tar]paper shack which frequently had to be moved as construction progressed. The mud was ever with us during this period and the only way to get to and from the office shack was to put on overshoes and start wading" (KOP [1945]:331).



Figure 15. An unidentified temporary pine and tar paper structure at KOP (photo courtesy Peter Kiewit Sons' Inc.).

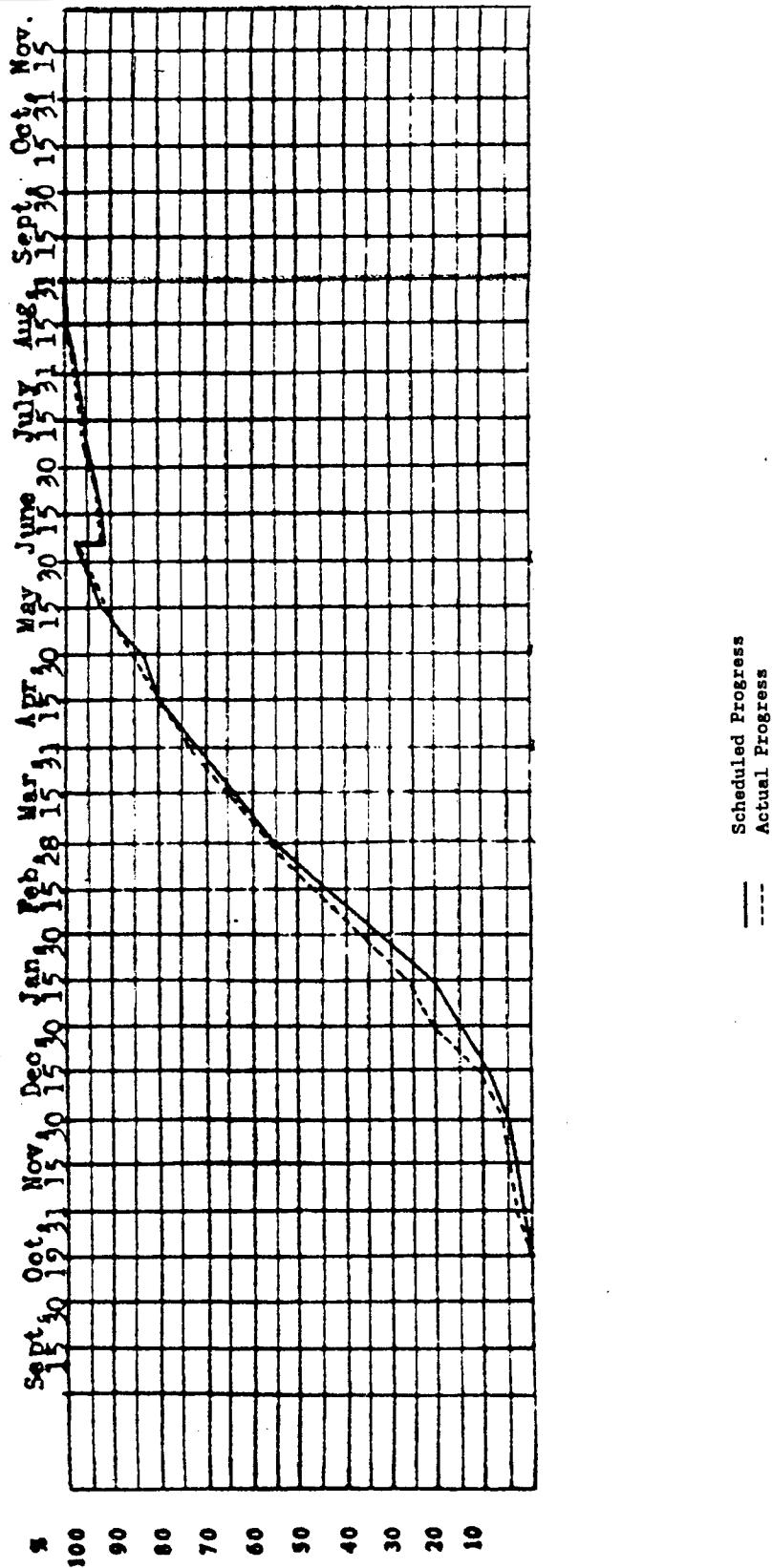


Figure 16. Scheduled versus actual construction at KOP (War Department 1942).



Figure 17. Surveying the muddy conditions during grading operations in the Inert Storage Area (photo courtesy Peter Kiewit Sons' Inc.).

Winter's freezing weather mitigated the problem of mud, but was accompanied by its own difficulties with cement poured during this time. Since many of the igloos (Figure 18) were built during winter (see Table 4), cement had to be kept from freezing until it had time to set up. "As most of the construction work was done during freezing weather, it was necessary to protect the concrete from freezing by using artificial heating. This heat was provided by coke burning salamanders [sic], and most of the fires which occurred during the construction era, were caused by these salamanders. The Fire Department maintained a twenty-four (24) hour roving patrol over the entire area and in this way prevented many fires" (KOP [1945]:110-111).

With spring and the rising temperatures, workers and managers had a reprieve from the mud and cold. But problems for those at work on the dam then being built across the Neosho River were just ahead. The river flooded in June 1942 and "washed out impounding structures used for backing up water for the plant" (Voight 1945:161). This was only one of "several interruptions . . . during the late spring and summer of 1942" caused by "the conditions of the Neosho River in flood stage" (War Department 1942:20).

It was reported that there was no shortage of materials during construction (War Department 1942:Field Progress Report, Part D). Steel was one of the earliest of the critical materials in short supply during the mobilization effort, but since most of the buildings at KOP were designed to use wood in place of steel, this caused no problem. Surprisingly, wood itself was in short supply during the spring of 1942—"there were enough trees, but not enough personnel, fuel, and equipment to cut them down" (Kane 1994:117)—but this does not seem to have affected construction at KOP. Documentation regarding CTQB&C's plans for the facility does not mention that vitrified clay tile was used in the design of buildings because the architect-engineers could foresee a timber shortage, but the use of tile may have avoided a problem in the procurement of wood during those latter months. There were also large plants producing the clay tile bricks at Pittsburg and Cherryvale at that time (Oxford, interview 1995). Local availability could have prompted the statement, in an August 1942 letter from the commanding officer of KOP to the Chief of Ordnance, that a design incorporating "tile walls and roof shingles over wood sheathing" was the "most economical general plan" (KOP [1942]:14). This came just after the architect-engineers and constructing contractors were notified that they were not to use steel.

That there were sufficient supplies at the facility is shown by the work of the Salvage Department after the end of construction. That department "recovered over 100,000 board feet of useable lumber from the scrap piles," as well as "approximately 1,500 truck loads of kindling" (KOP [1945]:9). One construction employ remembered that "there was a lot of waste, [but] not as much as a lot of people thought there was. I've heard, heard people say, 'oh, out there, they just take a truckload of nails and dump them down and cover them up,' well I never saw that" (Oxford, interview 1995). He later said that the stories of waste were the exaggerations of people who had never visited the plant.

Peak employment at the construction site was between 10,000 to 12,000 persons (KOP [1945]:101), although the number was reported to be as high as 17,000 (Oxford, interview 1995). There were no strikes or labor disturbances during construction (War Department 1942:20), but the turnover rate was high and there were "a noticeable number of 'mail order' carpenters and other self-rated 'skilled craftsmen' who applied for and obtained work during the construction period" (Voight 1945:161). Perhaps as many as half the construction workers were farmers from Labette County and surrounding counties (Oxford, interview 1995; PS 1942d:1). Since the pace of construction remained on schedule, it is unlikely that either the high turnover or the skill level of the employees caused undue problems.

Assembly Line Construction

As noted in the section concerning the design of the facility, many of the buildings and building sections were designed in standard widths to incorporate standard components. This helped speed construction by allowing

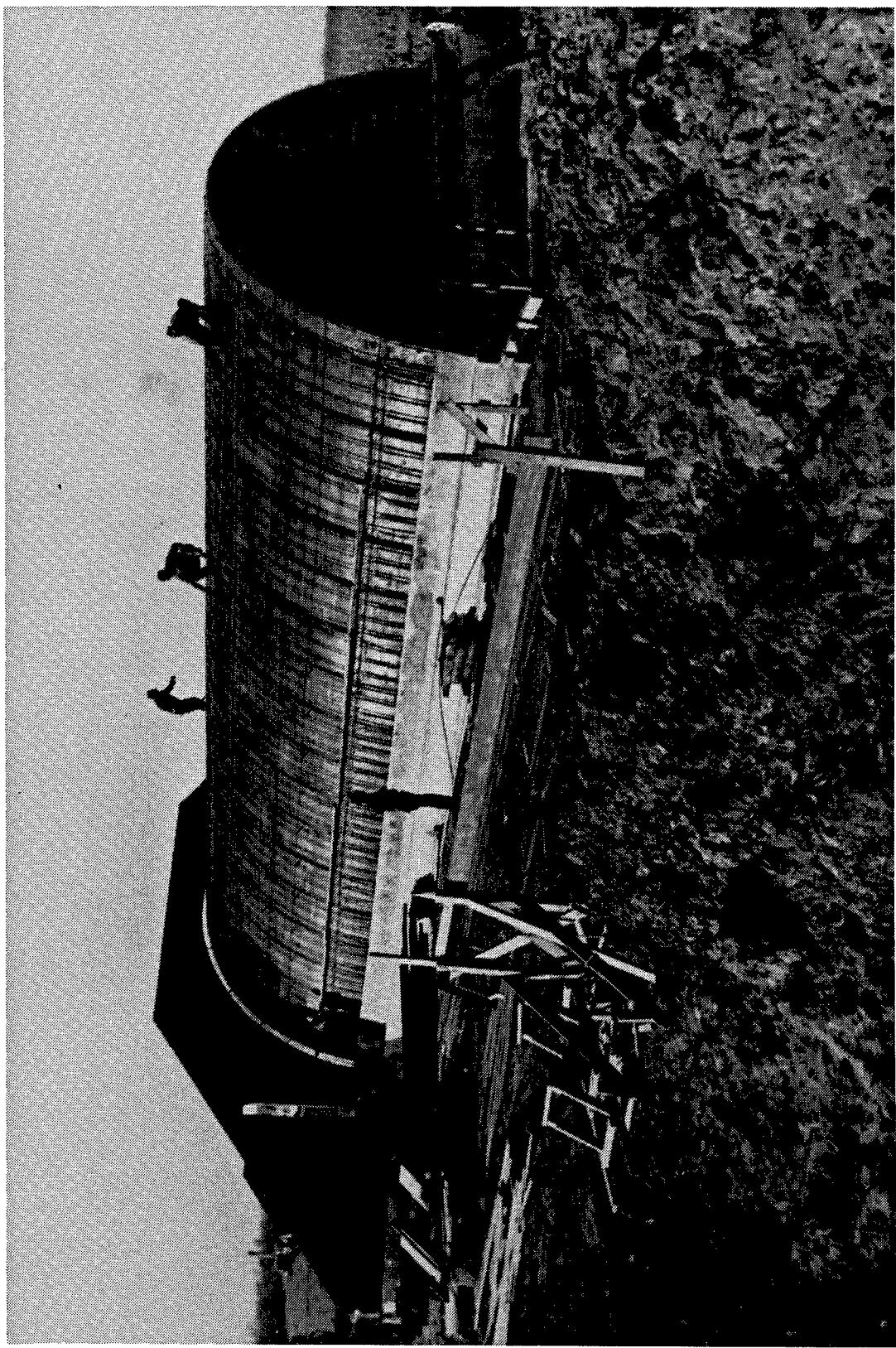


Figure 18. Construction underway on an igloo. Here, reinforcing rods are being set prior to pouring the concrete (photo courtesy KAAP).

trusses and wall sections of standard design to be built in one area (Figure 19) then transported to the building site (HABS/HAER 1984:16-19). Even roof sections, like those of the covered walkways that connected many buildings within the production areas, were prefabricated (Figures 20 and 21). The eight dormitories were all “prefabricated and assembled in sections” in this manner (KOP [1945]:53). This method of construction allowed buildings to go up “from foundation to roof in three days time” (KAAPSULE 1971:2; Figure 22). An article in the *Parsons Sun* (1942o) compared the construction of these sections to what most people then thought was the most modern type of factory in existence—a “motorcar factory.”

There is a long endless belt that carries materials along, each man having a certain duty to perform in a specialized way. Walls, partitions and floors thus are turned out rapidly and according to exact, uniform specifications on jigs on bench platforms. Carpenters install doors, windows, sash finished, trim, hardware and screens, all in finished units at the shop, with every convenience for working, rather than at the building site in the hot sun, rain or mud.

The staff houses were also all prefabricated (VOX KOP 1942a:1), built offsite by the Southern Mill and Manufacturing Company, of Tulsa, Oklahoma (Southern Mill and Manufacturing 1942). These were built much less sturdily than other buildings at KOP. They had concrete block foundations, with 2-x-3 wall studs (Southern Mill and Manufacturing 1942), rafters on four-foot centers, and 2-x-2 ceiling joists (Oxford, interview 1995).

End of Construction

By 30 June 1942, construction was 93 percent complete. At the end of July all construction was frozen by the Chief of Engineers, so the last month of work had to be specifically approved by the Chief of Engineers (KOP [1942]:15). On 31 August, the last of the Kiewit, Condon, and Paschen construction crews and employees of CTQB&C left the site (KOP [1942]:4). Work on the 20 staff houses continued into September (KOP [1942]:119), but that work was funded by a separate lump-sum contract (KOP [1942]:10). Over 14 million person-hours had been expended by the architect-engineers and construction forces by the end of the year-long project.

The original estimate of the cost of the facility was reported to have been \$24,856,472 (KOP [1942]:9), but that figure increased with time as changes and additions were made to the facility—as late as the end of August 1942, the working estimate for the final completion of the entire project was \$28,775,049 (War Department 1942:Exhibit 14). When the tabulations of the cost were completed, the actual completion cost was four million less than that figure (KOP [1942]:9; Voight 1945:161). Coming in under budget was unusual for a GOCO facility, and KOP “may be termed one of the few plants construction and equipment of which proved to be actually less than estimated” (Voight 1945:161). Determining exactly where savings were achieved is difficult if not impossible since the only extant record of actual and estimated costs seems to be the Completion Report, which lists the “original” cost estimate as \$24.8 million and the actual cost as \$24.9 million, these dated 30 November 1942 (War Department 1942:Tentative Detail Cost Statement¹²). Since there is no breakdown by structure or area to show how estimators calculated the \$28.7 million figure given as the working estimate of the final cost (War Department 1942:Final Progress Report, Part D [dated 31 August 1942]), it is not possible to see what aspects of construction actually cost less than anticipated. It is not known whether the “original” cost estimates of the Tentative Detail Cost Statement reflected the change from steel to tile and wood construction, but it is likely they did. And the actual cost for the intraplant railroad system was \$1.3 million, only slightly below the “original” estimate (War Department 1942:Tentative Detail Cost Statement). Since the system had been reduced from 125 to only 30 miles of

¹² In the title of this page, “Final” was crossed out and “Tentative” typed in above. Since these figures were included in the final version of the Completion Report, they were probably the final figures.

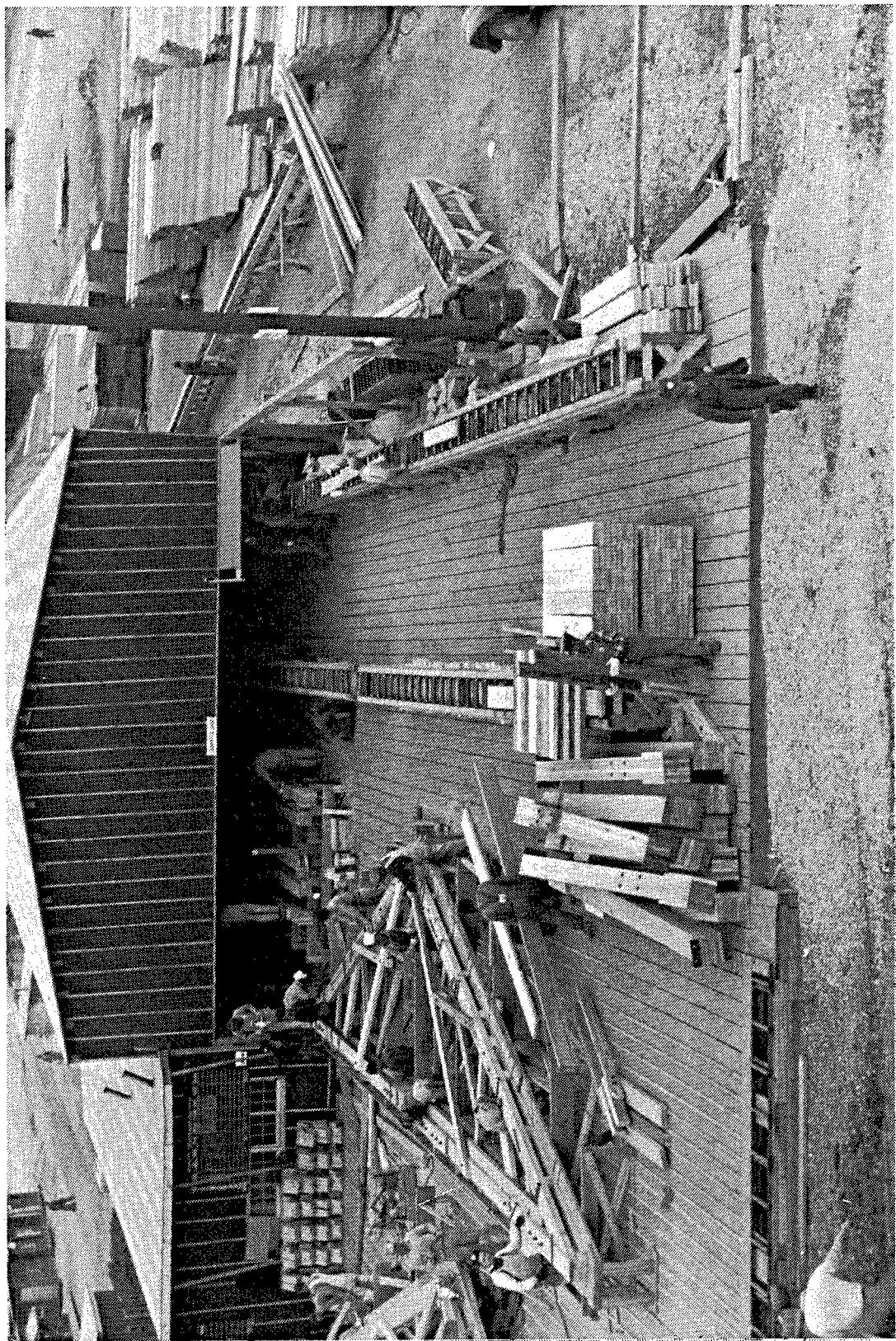


Figure 19. Standard building sections were built at the Carpenter Shop (Building 207), then moved to the building site. Here, trusses were being assembled. Note the two conveyors (center) along which cut lumber was moved to assembly stations (photo courtesy Peter Kiewit Sons', Inc.).

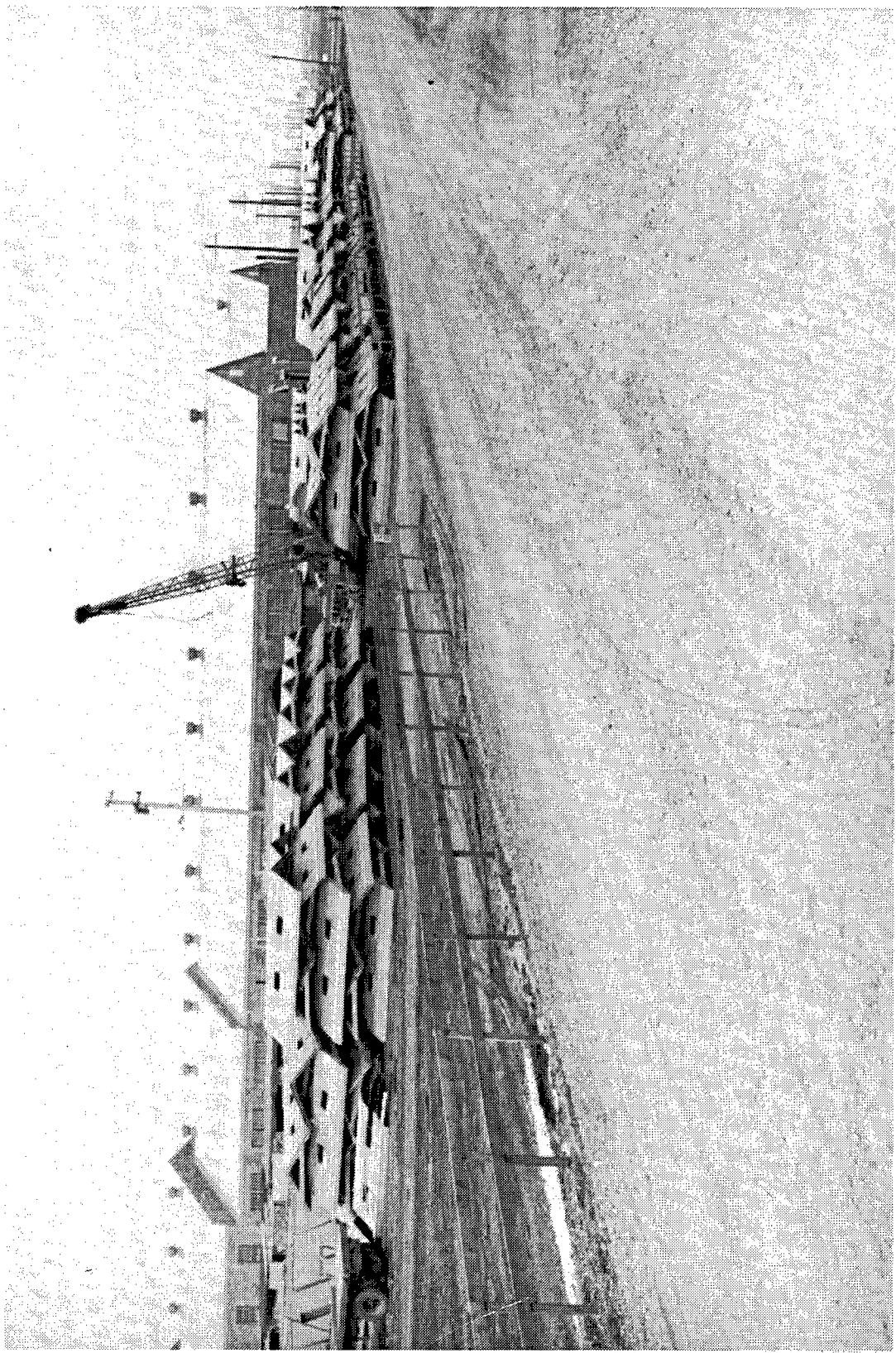


Figure 20. Preassembled roof sections for the covered walkways, which connected many production buildings, await installation (photo courtesy Peter Kiewit Sons', Inc.).

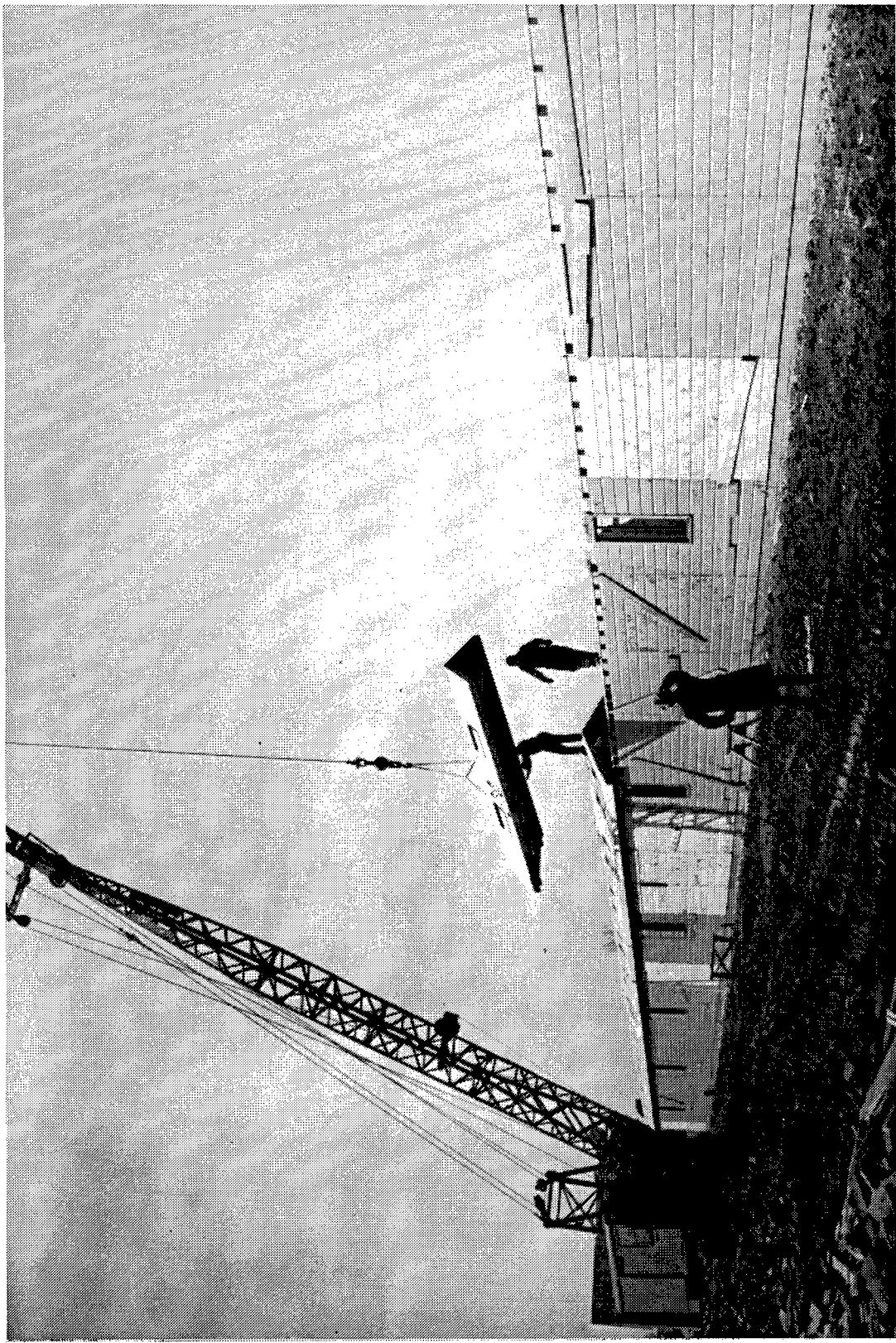


Figure 21. Preassembled roof sections for a covered walkway in one of the production areas being set in place (photo courtesy Peter Kiewit Sons', Inc.).

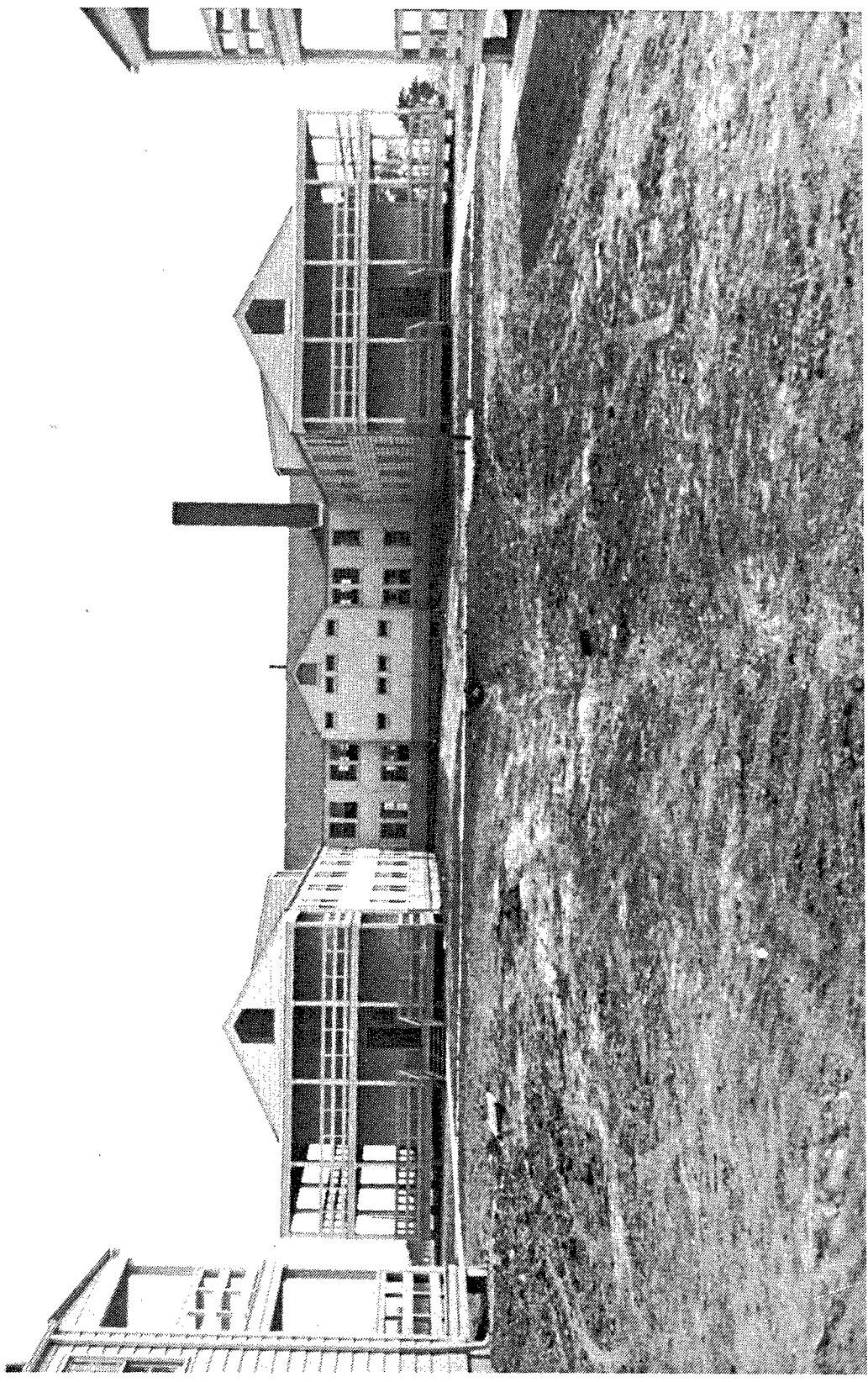


Figure 22. One of the dormitories in the Administration Area. The eight dormitories were reported to have each been built in about three days (photo courtesy Peter Kiewit Sons', Inc.).

track, it is very unlikely that this estimate was actually original. It is possible that this step alone substantially reduced the cost of the facility. At \$1.3 million for a 30-mile system, a 125-mile system could have cost as much as \$5.4 million.

Another reason construction came in on budget if not below may have been due to the efficiency and knowledgeableness of the general contractor. Both Peter Kiewit Sons' and Paschen Construction had experience working on large projects, which may have made the effort at KOP more orderly and cost effective than it possibly was at some other GOCO construction sites. Corps of Engineers personnel stated that the partnership of Kiewit, Condon, and Paschen

exhibited outstanding ability in setting up a very efficient organization for the construction program. The organization was headed by excellent key personnel coordinated to handle all problems in connection with construction. The contract was executed promptly and in a workman like manner efficiently handling all operations in the field with unusual initiative and resourcefulness (War Department 1942:20).

Bombs and Shells From the Kansas Prairies

The Johns-Manville Service Corporation

The government awarded the KOP operations contract to a subsidiary of the H.W. Johns-Manville Corporation, New York, today known as the Manville Corporation, which has its head office in Denver, Colorado. One of the forerunners of the Manville Corporation was founded in New York City by Henry Ward Johns in 1858, when Johns was only 21 years old. The H.W. Johns Manufacturing Company specialized in the manufacture of asbestos materials, primarily roofing, textiles, and insulation. Johns developed a number of applications for the "mineral of a thousand uses" (Derdak 1988a:291) during the ensuing 40 years, until his death in 1898, thought to have been caused by asbestosis. The Manville Covering Company, Milwaukee, Wisconsin, was founded in 1886 by Charles B. Manville (Derdak 1988a:291). Manville produced coverings for pipe and insulation for cooling and heating systems—it soon became the western distributor for the Johns Manufacturing Company products (Schuller International, Inc., n.d.:n.p.). The two companies merged in 1901, creating H.W. Johns-Manville (J-M), which mined, manufactured, and supplied asbestos and asbestos products to industry and the government. J-M continued to grow, acquiring several U.S. and Canadian companies in the 1920s and early 1930s. In 1927, J-M became a public corporation (Derdak 1988a:291).

By 1929, J-M was already being taken to court for employee deaths that were presumed to be asbestos-related. Two diseases were linked to the deaths— asbestosis, a scarring of the lungs caused by exposure to asbestos; and mesothelioma, a form of cancer affecting the linings of the abdominal cavity and chest. J-M was plagued by such lawsuits for the next several decades, most related to its responsibility for informing workers about possible hazards. J-M often successfully defended itself by claiming that workers should have known of risks and taken precautions. Conversely, it argued until 1964 that there was no known reason to warn insulation workers of the harmful effects of working with asbestos, even though action to measure or limit asbestos dust had been recommended to J-M long before. That recommendation was based on a four-year Metropolitan Life Insurance Company study conducted during the early 1930s.

By the beginning of World War II, J-M was a leading world-wide supplier of asbestos, and likely supplied the Ordnance Department and contractors with transite or the asbestos used to manufacture transite, used at many GOCO industrial facilities. This and the "thousands of tons of asbestos [used] in building ships and airplanes" (Derdak 1988a:292) helped to make 1939 through 1945 a very lucrative period for the company.

Although it is not known whether the use of asbestos in GOCO facilities prompted later legal action, many other workers and seamen exposed to the material during this period did later file suit against J-M.

The KOP Production History

The first line to go into operation was the Demolition Bomb Load Line (1100 Area), where 57 (250-pound) bombs were filled on 14 April 1942 (Table 5). This line had been given top priority for quick completion (KOP [1942]:15, 21). But JMS began preparing for the beginning of operations long before that. As a result of what JMS managers called the “get acquainted period” (KOP [1942]:18), the company set up a Production Planning Department, which was responsible for collecting the knowledge that munitions production would require. The work of this department officially began 13 August 1941, when the first group of JMS personnel arrived at the facility to begin hiring line supervisors and other personnel to be responsible for the planning effort (KOP [1942]:20-21). It would be an enormous task—“to be sure, progress was slow at first and facilities for handling the men employed were limited. Not only were those in Johns-Manville a bit hazy regarding certain of the work which was to come later, but all of the individuals employed had had no previous experience in shell loading or explosive work” (KOP [1942]:20).

Table 5
Dates of First Construction and Operations at Kansas Ordnance Plant

Area Number	Date Construction Began	Date Operations Began
1100	5 November 1941	14 April 1942
1200	6 December 1941	3 May 1942
500	6 December 1941	5 May 1942
300	13 December 1941	3 July 1942
700	13 December 1941	19 June 1942
1000	2 January 1942	23 June 1942
800	16 January 1942	30 June 1942
900	20 January 1942	14 July 1942

Source: KOP [1942]:n.p.

The get acquainted period began even earlier. To learn more about the processes involved in the manufacture of munitions, JMS personnel visited Picatinny Arsenal, Savanna Ordnance Depot, and several GOCO facilities. These included Ravenna, Iowa, Elwood, Wolf Creek, and Kingsbury ordnance plants, all LAP facilities then under construction (KOP [1942]:18). Although it seems that Picatinny was presented to the JMS personnel as the source of many manufacturing specifications and procedures, JMS managers learned during the get-acquainted period that “some of the information obtained at Picatinny would not necessarily apply to operations in Kansas” (KOP [1942]:19). Picatinny was to be viewed as an “experimental plant where new types of ammunition were loaded”; the Kansas facility would be much larger, adapted to “take care of the ever increasing demands” for munitions (KOP [1942]:19).

It was the trip to Savanna that prompted the setup of the Production Planning Department. There, JMS personnel were able to see a bomb load line in operation and discuss practical matters concerning the design and operations of the facility with the operators. After the trip, the management thought it desirable to set up a department specifically dealing with production planning, including the design of the plant and manufacturing procedures. “This information was to be given to the architect engineer, so that engineering

layout would fit in with definite fundamental handling procedures which would give a direct and satisfactory flow of inert parts, explosives, and finished ammunition to, through, and from operating lines" (KOP [1942]:19-20).

Although some processes from Picatinny did not apply to KOP, the Production Planning Department did receive assistance from that arsenal. Documentation sent to KOP included standard practice books regarding operations, which the Production Planning personnel supplemented with their trips to other facilities, collecting more information about "tools, equipment, personnel, job classification, plant layouts, employee training and the like" (KOP [1942]:21-22).

All the production lines at KOP were operational by the end of the summer of 1942 (see Table 5), and by October of the same year, the plant had become "the first plant of its kind [bomb and shell loading] to receive the Army-Navy 'E' Award" (KOP ca. 1985:1). In awarding this citation for excellence, several aspects of plant operation were taken into consideration. These included "(1) Full utilization of available equipment; (2) Avoidance of stoppages; (3) Maintenance of fair labor standards; (4) Cooperation with the war program; (5) Effective management and engineering; (6) Record on accidents, health, sanitation, and plant protection; (7) Utilization of subcontracting facilities; (8) Training of additional labor forces" (VOX KOP 1942g:2). The award, a combination of the older Navy "E" and Army "A" awards, was important not only as a means of congratulating the agent-operator, but also for instilling enthusiasm and pride in personnel at the facility.

During the first few months of operations, JMS learned more about what managing the facility entailed, and that "some method of control had to be installed whereby subsequent costs of plant operation could be held to a minimum" (KOP [1945]:31). This work was encouraged by a 24 April 1943 memorandum from the Adjutant General's office requesting that "spartan simplicity be observed, that there be nothing done merely to contribute to beauty, convenience, comfort or prestige" (emphasis in the original; KOP [1945]:32). A thorough investigation by an industrial engineer found that savings could be affected in eight areas, including appearance, safety requirements, and maintenance (KOP [1945]:32). Thereafter, a system was set up whereby changes of any kind would be investigated to determine whether implementation would actually result in savings (KOP [1945]:33-34).

The first half of 1943 was marked by a reduction in the work force, due in part to increases in efficiency, in part to decreased production schedules. One example of the implementation of greater efficiency can be seen in the Fuze Load Line. By the beginning of 1943, more than three million fuzes had been produced by the personnel on this line, so they were by then very competent at their jobs, and JMS managers thought they could probably reduce the amount of labor needed to produce a fuze. "By the use of time studies and by rearrangement of some of the operations the operating force was reduced from 270 to 220. During this period the man hour costs per hundred unit fuzes was reduced from 18 to 16.78 with the goal of 13 man hours per hundred unit" (KOP [1943]a:60). The operators of the facility felt their efforts in this area were quite successful—"The Kansas Ordnance Plant enjoys the enviable position of having the lowest man hour direct labor cost for several of the products loaded here at the present time. This conclusion was drawn as a result of comparisons sent out from the office of Field Director of Ammunition [Plants], St. Louis, Mo." (KOP [1943]a:24).

Agreements with various labor unions were signed during 1943 (Table 6), bringing most employees under union guidelines. Agreements with the Brotherhood of Railroad Enginemen (*sic*) and the Brotherhood of Railroad Trainmen were not signed (KOP [1943]a:28) because these two organizations had "set forth certain provisions that are not agreeable to the Operating Contractor and not in keeping with certain War Department requirements" (KOP [1943]c:1). An agreement between the Painters, Paperhangers, and Decorators of America was not negotiated until the near the end of the year because the union did not in the beginning request an agreement (KOP [1943]a:29; KOP [1943]c:1). "All production, engineering and maintenance, storage, and transportation employees" not included in the above unions or those listed in Table 6 were represented by the United Mine Workers of America after a vote on the matter in July 1943 (KOP [1943]c:1-2).

Table 6
Labor Agreements in Force at Kansas Ordnance Plant

Union	Date Agreement Signed
International Brotherhood of Firemen and Oilers	29 January 1943
Brotherhood of Electrical Workers	24 February 1943
International Association of Machinists (representing millwrights, sheet metal workers, and welders)	8 April 1943
United Association of Journeymen Plumbers and Steam Fitters of the United States and Canada	4 February 1943
United Brotherhood of Carpenters and Joiners of America	6 April 1943

Sources: KOP [1943]a:1, 28

The negotiations for the work agreements were not always smooth, it appears. "During repeated negotiations and conferences, in some of which Commissioners from the United States Conciliation Service sat in, we have been unable to reach mutual agreement on certain provisions of the proposed agreement; the two important points involved being adoption of a straight seniority clause rather than the seniority clause agreed to by the Secretaries of War and Navy, Green of A.F. of L. and Murray of C.I.O., under a labor policy for operation of the government-owned, contractor-operated War Plants, and a demand for increased wages which the Company does not feel is justified by comparison to the comparable wage rates paid by common carriers in this Division" (KOP [1943]a:28).

In February 1943, the first 1,000-pound bomb bodies were received at KOP (KOP [1943]a:1-2), and shortly thereafter, the loading of the 250-pound bombs was discontinued (KOP [1943]a:82). Production in other areas was also being changed. By the end of March, the number of employees working on the Detonator Load Line (700 Area) had dropped from 336 to 188, a drop probably due to the reduction in the schedule from 800,000 to 500,000 units a month (KOP [1943]a:58-59) rather than to increased efficiency in the use of labor. By the end of the first quarter, the only production areas operating 24 hours a day were the three load lines (KOP [1943]a:76). The Fuze Load Line and Detonator Load Line were both closed in May 1943 (KOP [1944]b:114, 118; KOP [1943]b:2). "This [closure] was in compliance with the general over-all plans of the War Department to suspend operations of all components and end items that had already been produced in sufficient quantity to meet the needs of the War" (KOP [1944]b:118).

Production schedules were again increased in the second half of 1943, bringing about a need for more labor (KOP [1943]c:1). A recruitment campaign was initiated with the help of the U.S. Employment Service, the area of concentration being the nearby communities. That area was soon expanded to cover portions of Kansas, Oklahoma, Missouri, and Arkansas, "and although considerable difficulty is being experienced, the possibility of securing sufficient personnel has improved" (KOP [1943]c:2). Locating sufficient labor would continue to be a problem for the facility during the entire World War II operations period. JMS had expected to have to employ as many 10,000 to 14,000 people during operations (KOP [1945]:54, 58). Since peak employment, counted in January 1945, was only slightly over 7,000 it is obvious that finding that many employees would have been difficult.

At the end of 1943 there were several changes to the production lines. The 155-mm Shell Load Line was closed in October, to be converted to load 75- and 105-mm shells and 120-mm propellant charges, going on line again in April 1944 (KOP [1943]d:10; KOP [1944]a:2; KOP [1945]:185). The 1100 Area Bomb Load Line was shut down at the end of November (KOP [1944]b:216) and converted to the production of 4.2-inch

chemical mortar shells¹³, resuming operations in March 1944 (KOP [1942]:2; KOP [1944]b:222, 225). The Ammonium Nitrate Plant (1200 Area) was closed in April 1943 (PS 1943d), then reopened in December to produce approximately 80,000 pounds of the material a day for use by the Holston Ordnance Works (KOP [1943]d:3, 10). The Primer Load Line was permanently closed in March 1944. All equipment of use to other plants still loading primers was dismantled and transferred to those facilities (KOP [1944]a:3). In spite of such changes during the latter part of 1943 and early 1944, KOP won two more Army-Navy "E" awards during the period. The second award was presented on 28 August 1943, the third on 18 March 1944 (KOP [1944]b:196; KOP ca. 1985:1).

The Fuze Load Line, which had been closed in May 1943, was converted so that it could process ammunition returned from overseas (ARFO). The first 75- and 105-mm ARFO arrived at KOP on 6 July 1944 (KOP [1945]:297), but it is unclear whether the conversion of the Fuze Load Line had already begun at that time. The conversion began either sometime in the summer (KOP [1945]:292) or in October, when the plant received its orders to "start disassembly and wash out procedure of 105MM ARFO" (KOP [1945]:297)¹⁴. By December, after approximately 29,000 shells had been disassembled and cleaned, orders were sent from the St. Louis Field Director of Ammunition Plants (FDAP) to halt that work and to "prepare to disassemble, inspect and repack all lots of 105MM ammunition that contained 500 rounds or more. We were told that ammunition was urgently needed in Europe. The Germans had started a drive into Belgium. One hundred fifty soldiers were sent to K.O.P. to segregate 105MM ammunition by lot number" (KOP [1945]:300).

In July, the 1100 Area, which had been converted to the production of 4.2-inch chemical mortar shells, again began loading 1,000-pound bombs. This entailed a great amount of work since the nearly 30,000 bomb bodies still at the plant after the loading of these bombs was discontinued had been left outside in the weather. An extensive amount of effort was expended cleaning all the rust off the bodies and repainting them (KOP [1945]:264).

Also during the summer of 1944, plans were made to construct x-ray facilities at the plant. The x-ray setup was modeled on "the three already in operation at other loading plants" (KOP [1944]c:3). Which three plants already had x-ray facilities is not known at this time. The x-ray equipment was expected to be operational by September 1944, but problems procuring the equipment delayed the beginning of operations until April 1945 (KOP [1944]d:11; KOP [1945]:147).

Again, in spite of the many changes implemented at the facility, or perhaps because of the adaptability of the agent-operator and operations personnel, KOP won yet another "E" award, announced 16 September 1944 (KOP [1944]d:28). At the same time, the Property Division of the Ordnance Department was taking "drastic steps to secure full cooperation of the Operating Contractor in accounting for Government property" (KOP [1944]d:49). These steps included surveys of accounting procedures, where many problems were reported, but JMS was able to comply with all Ordnance recommendations (KOP [1944]d:49).

In the last quarter of 1944, the core melt, or hot-tube, procedure of loading shells was put into production in Building 1109. This procedure, invented at KOP, is discussed more fully in the technology section below. It was important not only for KOP but for all shell and bomb loading facilities as it brought about "a big savings in operators . . . [and] made a better quality shell" (KOP [1945]:269).

¹³ The 4.2-inch chemical mortar shell was designed by the Chemical Warfare Service for use with chemicals, primarily for producing smoke screens. Troops would sometimes launch a few explosive shells with the chemical shells, which "was found particularly effective against enemy personnel" (KOP [1944]a:7). In the first quarter of 1944, KOP may have been the only facility loading the 4.2-inch shells with explosives (KOP [1944]a:28).

¹⁴ Yet another states that by 9 August, this line was operating three shifts a day reworking ARFO (KOP [1944]d:65).

With all the changes in operations and production schedules that had been handed down to JMS, management of the facility was probably very frustrating. Accompanying these frustrations were numerous inconsistencies in Ordnance requirements and orders, some of which were the result of production alterations. One example comes from the last quarter of 1944.

We were told to rework all containers [fiber containers for 105-mm shells] that could be reworked by water-proofing cut and scuffed places with asphaltic paint. A production line was set up to rework containers. Containers were inspected by Production operators and passed for rework or discarded for burning. We reworked all except those badly cut or damaged and felt we were producing a good water-proof container. But when we used these reworked containers in production, the Inspection Departments [probably Ordnance inspectors, but these may have included JMS inspectors as well] would reject any that had been scuffed or cut through the outer layers of asphaltic paper. This was in keeping with their inspection procedure for fiber containers sent out of St. Louis Ordnance Office [the FDAP office]. We in the Production Department and most of the people in the Inspection Department feel that this inspection ruling is entirely unreasonable. It resulted in thousands of good useable fiber containers being burned. Our contention is that in reworking we water-proof containers with asphaltic paint and we have not been disproved [sic; apparently a line of text was not typed into the report]. Ordnance Inspection Department is required to sign [a] rejection ticket to authorize [the] burning of containers. We have difficulty in getting their signature on tickets for containers reject[ed] by their own directive (KOP [1945]:301-302).

Another contradiction involved how tight the ammunition had to be packed into new and reworked containers. "We were required by Ordnance Inspection to have an absolutely tight pack with a gap not to exceed one-eight[h] inch [in new containers]. Ordnance Inspection held firm. . . . We in Production feel that a gap of one-quarter inch gap should be allowed. Ordnance now allows a one-quarter inch gap when ammunition is packed in rework[ed] containers; just another one of the inconsistencies that have been encountered" (KOP [1945]:313-314).

There were problems with new containers as well. During the first quarter of 1945, KOP was buying containers just for 105-mm shells from as many as 18 different vendors. "Every manufacturer was busy, and in order to have ample boxes at the time needed we secured boxes everywhere" (KOP [1945]:186). The problem was interchangeability—since the lids of one vendor often fit containers from another vendor either to tightly or too loosely, all lids had to be kept with their original containers (KOP [1945]:304).

Other problems involved the repacking of ARFO and the new x-ray units. While repacking the ARFO in the 300 Area, it was discovered that "all M48 fuzes loaded in 1941 at Picatinny Arsenal were bad. Plunger support and centrifugal pins due to defective plating of parts were corroded so much that some of the centrifugal pins were stuck tight to the delay body" (KOP [1945]:304). And when the x-ray units first went on line in the 900 Area in the second quarter of 1945, JMS found out that "our ammunition which before X-ray was considered 'good' was not of such quality" (KOP [1945]:201).

A fourth and final "E" award was presented to KOP on 17 March 1945 (KOP ca. 1985:1). In September, after the end of the war, KOP was turned over to the government and placed on stand-by. It was soon declared surplus and put up for sale by the War Reconstruction Finance Corporation. That order was later rescinded and KOP was made a storage facility, which it continued to function as until August 1950 (KOP [1951]:1; KOP [1967]:1).

The Performance of the Agent-Operator

Little needs to be said of the performance of JMS. The value of their work at KOP can be seen by the presentation of the five Army-Navy "E" awards and can also be seen in the technology section below. With

the help of the Planning Department, the architect-engineers and the general contractors designed and built a facility on schedule and under budget, and most production schedules were met in spite of a wide variety of problems. JMS' attention to cost effectiveness, organization, and their consistent efforts to improve procedures and equipment resulted in savings to the government and some per-unit manufacturing costs well below the industry average (Table 7). Credit for the agent-operator's work is also due to the employees. Peak JMS employment during World War II hit 7,358 (KOP [1967]:1), and a total of about three times that number worked at the plant throughout World War II. Although the author was speaking specifically of workers in the 900 Area, the following words may have expressed the appreciation felt by many of the JMS personnel—"Line I opened operations July 14, 1942 with a field of employees to draw from, 98% of whom had had no industrial training background. As we think back we believe that these untrained people did wonderful work, were quick to learn and were willing workers" (KOP [1945]:206).

Table 7
Sample Per-Unit Manufacturing Cost at Kansas Ordnance Plant

Type of Ordnance	Industry Average	KOP Average
<i>Booster-M20A1</i>		
March 1944	.1854	.0971
March 1945	.04475	.0352
<i>1000-pound Bombs</i>		
March 1943	35.955	24.19
January 1945	12.76	6.85
<i>105-mm Shell</i>		
January 1944	2.65	1.89
July 1945	1.695	1.41

Source: KOP [1945]:29-30.

THE EVOLUTION OF TECHNOLOGY AT THE KANSAS ORDNANCE PLANT

JMS made many improvements to the equipment and processes used for production during World War II. Research into operations at other facilities seems to indicate this was not unusual among agent-operators of GOCO industrial facilities, but a definite assessment would require research beyond the scope of this project. In contrast to at least the public perception of ordnance production during World War I, many private enterprises working for the government during the Second World War appear to have been very conscientious about producing arms in a cost effective and efficient manner. "The need for rapid volume production of munitions resulted in the development, within a few years, of numerous innovations in Industry which otherwise would have been achieved only over a much longer period, if at all," these innovations being made by "public and privately supported research agencies, by the technical staffs of producing plants, and by other plant employees" (Campbell 1946:85). At the Illinois Ordnance Plant, a continual effort was made to reduce costs (Kane 1994:220). At Radford Ordnance Works, "changes in equipment occurred throughout production to increase efficiency, safety, and production" (Neville and McClane 1995:58.). The same was true of the Hoosier Ordnance Plant (Gaither 1995:88). Of course, aiding the war effort was one motivation behind the drive for greater efficiency, but the motivation provided by a CPFF operations contract under which agent-

operators were paid by the piece should not be ignored, even if that source of motivation is not mentioned in the plant's historical record.

The production methods, layouts, and equipment recommended by the Ordnance Department were not up to industry standards of the period—private enterprises had developed “new machinery and better layouts for the loading of ammunition with much success” (KOP [1942]:24-25). JMS personnel felt that one of the more serious deficiencies was in the limited use of automated machinery.

Much can be done on this with a resulting reduction in needed labor. For example, during the first World War 155 m/m [sic] shells were poured using a tub and bucket, and now in this war the same practice is used. Industrial engineering and other studies properly directed during the past years of peace, no doubt, would have revealed ways and means of improving this operation and others. Johns-Manville and private industry spent many hundreds of thousands of dollars each year in the development of new products, new methods and for the construction of new plants and facilities to meet the ever increasing needs for those products. A similar program fostered by the Ordnance Department would very definitely place this section in a much better position to cope with future emergencies much quicker and at a lesser cost. This all seems necessary in order to keep the ammunition loading business up to date and ahead of our enemies and neighbors (KOP [1942]:24-25).

Production of Boosters, Detonators, Primers, and Fuzes

The components manufactured at KOP included boosters, detonators, primers, and fuzes. These were all part of the fuze explosive train, “. . . an arrangement of a series of combustible and explosive elements . . . [which] serves to accomplish controlled augmentation of a relatively small impulse into one of sufficient energy to cause the main charge of the munition to function” (Headquarters, Department of the Army 1969:2-11). Loading detonators involved mixing explosives and placing these in the metal detonator fixture (KOP [1942]:39). This line was closed in May 1943; by May 1945, part of the equipment had been removed (War Department ca. 1945:II:1:3).

Primer production began as a manual assembly process as well, but early in the war “many hand operators [were replaced] with automatic machines” (KOP [1942]:44). By the end of 1942, automated equipment was being used to assemble and wax the primer heads, insert paper liners into the primer bodies, dip the bodies in acid-proof black paint and wipe them to fill the flash holes, load the primers (using volumetric loading machines), apply sealant to the threads, and assemble the head to the body (KOP [1942]:44-45). The two machines inserting liners by themselves “increased the rate of production from 540 pieces per hour by hand to 1,600 pieces per hour” (KOP [1943]a:63). This line was closed in March 1944. By May 1945, nearly all of the equipment had been transferred to other plants (War Department ca. 1945:II:1:3).

Improving booster production involved reorganization of the assembly line. Changes in the organization of the line began in 1942, when the operations in buildings 507 and 513 were consolidated in the former, reducing the number of supervisors needed and freeing up Building 513 for storage (KOP [1942]:35). Operations were further consolidated in the summer of 1944 (KOP [1945]:178). An increase in the schedule for booster production, perhaps due to the Ordnance Department's call for increased production of light and medium artillery ammunition at the end of 1944 and beginning of 1945 (Thomson and Mayo 1991:146-147), prompted JMS to update equipment on this line in the spring and summer of 1945, adding several machines to better automate the assembly process (KOP [1945]:180-181). This line seems to have operated continuously throughout the war.

Fuze production involved the assembly fuze explosives and components, some of which were boosters, detonators, and primers produced at KOP, into a properly functioning unit (KOP [1942]:42). Like the Detonator Load Line, the Fuze Load Line closed in May 1943; it was converted to process ARFO in 1944.

The equipment used to load fuzes was transferred to the Arkansas Ordnance Plant (War Department ca. 1945:II:1:3).

Shell Loading

KOP produced more shells than any other type of ordnance during World War II operations, 13,744,466 shells in all (Voight 1945:163). A great amount of space in the historical record is devoted to explaining the changes and innovations involving shell loading. Shell components came from a variety of sources, including the Milwaukee Stamping Company (KOP [1945]:285) and the Arkansas Ordnance Plant, Jacksonville, Arkansas. They had "continual trouble" with the components from the Arkansas Ordnance Plant—"in general, the quality was very poor" (KOP [1945]:229). Shell cases were noted to have come from Lempco, Erie Basin, Bauer Brothers (locations unknown; KOP [1945]:227, 285), and the Oldsmobile Division of General Motors at Kansas City (KOP [1945]:187).

The loading process was in general the same for most shell types. The steel shell body was first inspected and painted. TNT or amatol was then screened, melted, and cooled from its melt temperature of 196°F to its pour temperature of 176°F. When the explosive fill had cooled, a hole was drilled into the fill to accommodate the booster, the threads were cleaned, then the booster and fuze were inserted. Some shells (such as those for the 105-mm howitzer) were then fitted to a cartridge case that had been loaded with the required primer and bags of smokeless powder, making up a complete round. The shell or complete round was then sealed in a fiber container and packed for shipment (KOP [1942]:37, 46).

There were four main upgrades of the technology originally installed at KOP that greatly affected shell loading, two of which were at least in part developed at the facility and were of national significance. The first was a method of pouring explosives into shells called the duplex pour (Figure 23). This unit eliminated the need to hand-pour explosives into the shells from buckets. Instead, the amatol or TNT was drawn from the second-floor mixing kettles into elevated tubs heated with steam. The explosives then flowed through two rubber hoses and into the shells (KOP [1944]a:26-28, 72-74). "In February 1944, two Duplex Pourers were installed. This improvement eliminated 80% of the manual task of pouring and enabled a time pouring schedule that could be used to an advantage. It also added to the cleanliness of the building" (KOP [1944]c:9).

The second improvement involved the vertical rather than horizontal drilling of holes in the explosive fill of the shells (necessary before the booster could be inserted). Horizontal drilling was the industry standard at the time. The vertical drilling procedure was in place by February 1944, when *Safety Digest* reportedly ran a story on the process. The development was due to the combined effort of KOP personnel in the Safety and Engineering departments, "the Technical Section of the FDAP and the Technical Section of the Safety and Security Branch" (KOP [1944]a:65). The greatest advantage of the new method was that it was safer, reducing the number of persons working with explosives in this step of production, and virtually eliminated the "exposure of the few remaining operators to toxic dusts" (KOP [1944]a:65).

The third innovation, and the most important development at the facility, was the core melt unit (Figure 24). In the summer of 1944,

development work was started on a machine that would melt out [the] shrinkage cavity in such a manner that one pour and top-off was all that would be needed to process the shell in a satisfactory manner. . . . It was decided to build a machine with 54 tubes to process regular shells (KOP [1945]:209-210).

The first core melt unit to be used in the industry was installed in Building 905 in September 1944 and used in the loading of 30,804 105-mm shells that month (the unit could not be used with shells smaller in size than the 105-mm). The successful application of the core melt unit prompted JMS to boast that this new machine

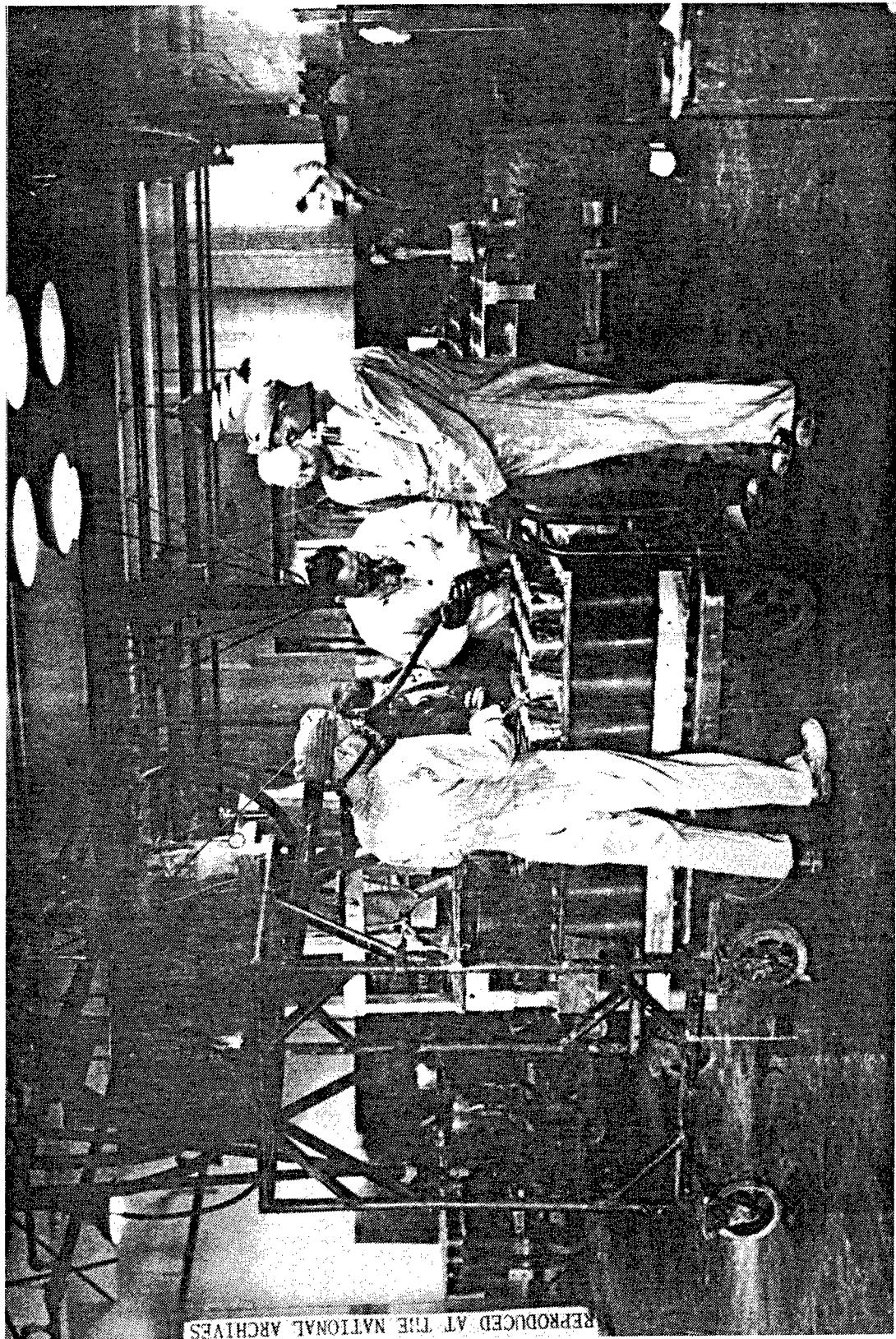


Figure 23. Operators filling shells with a duplex pour machine (KOP [1944]a.73).

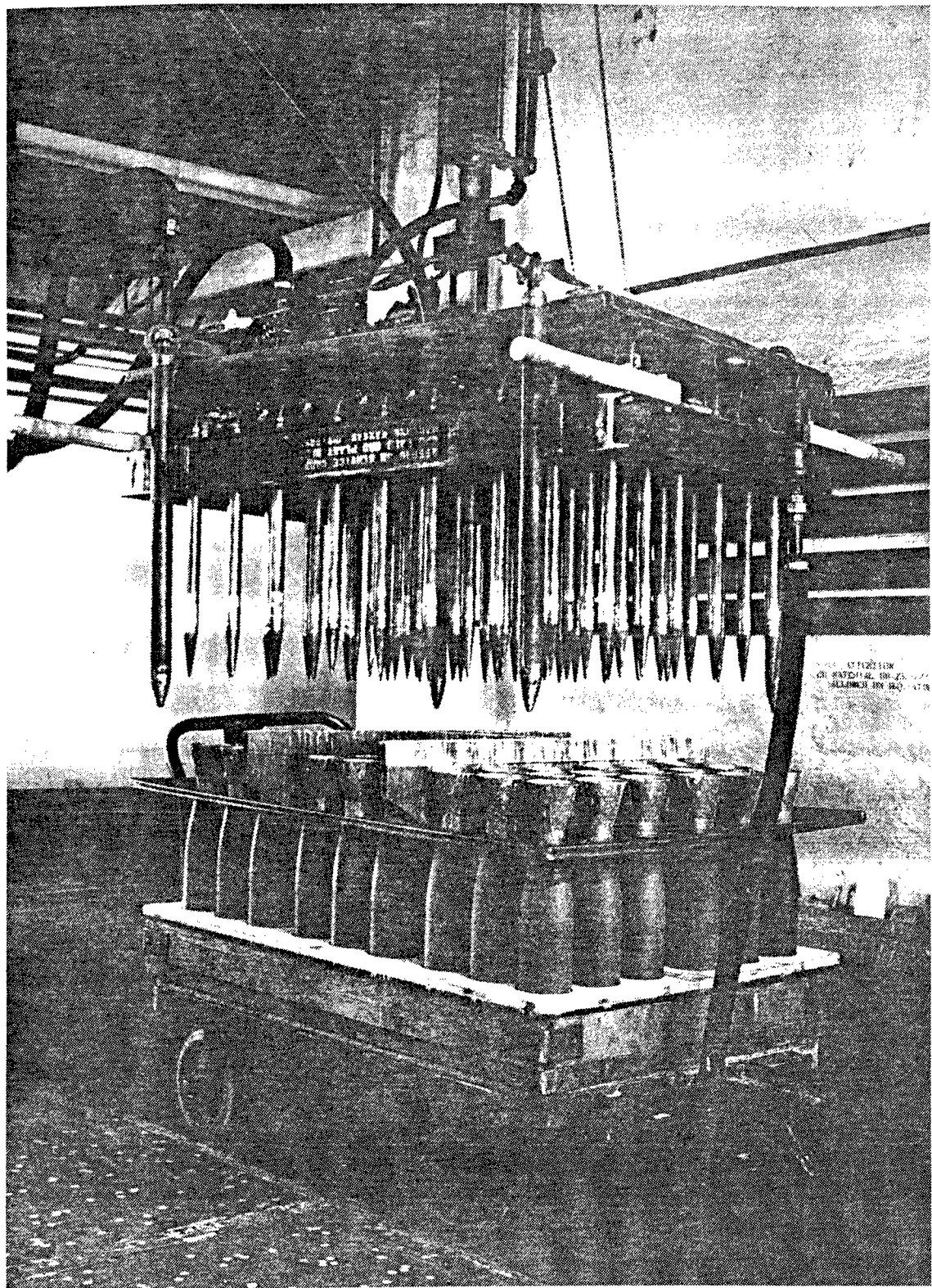


Figure 24. One of the first 54-tube core melt units, developed at KOP (KOP [1944]d:19).

“was destined to change shell loading more than any other advancement in the industry to date” (KOP [1945]:189) and that the “revolutionary idea was to affect safety, quality, quantity, cost, and help relieve the manpower shortage” (KOP [1945]:189-190).

By the end of the year, three core melt units had been installed in the 900 Area (KOP [1945]:192) and it was decided to incorporate the new technology into the 1000 Area, where deep-cavity shells¹⁵ were processed (KOP [1945]:209-210). There were some minor problems with using the machine to melt the fill of deep-cavity shells, but these were worked out so that “with the melt out units a very marked improvement in quality was shown” (KOP [1945]:211).

This new process appears to have been coordinated with a fourth innovation—the palletized shell, a shipping method likewise coordinated with the manufacturing process. It is not known how shells were previously shipped, possibly in crates, but with palletizing, begun in early 1945, 83 shells were placed upright on pallets and tied with wire (KOP [1945]:197). This seemingly simple alteration meant

a complete change [for Building 904, the Painting Building]. A channel-iron track approximately 80 feet in length was installed for loading trailers. Empty trailers were pushed on track and moved approximately 20 feet to the loading station. Palletized shells were fed from either side of [the] loading station where paper sleeves were removed from shells and then loaded on trailers, fifty-four shells to a trailer. The movement down the track of loaded trailers was by an air operated kicker (KOP [1945]:197).

An 83-tube core melt unit was installed in the 900 Area during the first quarter of 1945 (KOP [1945]:197), further simplifying these first steps in the loading process. All that was required was that the pallet wires be cut and the entire pallet placed on the monorail trailer by a forklift. Possibly because it reduced the amount of physical labor required in loading and unloading shells, this change allowed the agent-operator to use “100% female help in Building 904” (KOP [1945]:197-198), helping alleviate the labor shortage of that time.

The impetus for the research that generated these new manufacturing methods may have come indirectly from the Ordnance Department and its Ammunition Division in 1944, although research into the duplex pourer appears to have begun in May 1943 (KOP [1944]a:47). “At the start [of 1944] the emphasis was on slowing down the mounting tide of production as the defeat of Germany appeared more and more imminent, but at the end there was an almost frantic drive for more production at any cost” (Thomson and Mayo 1991:144). This drive was in part due to the fighting in Italy, “where artillery ammunition and bombs were used in huge quantities against strongly fortified mountain positions” (Thomson and Mayo 1991:145). In mid-May, a major increase in the production of medium-caliber ammunition was ordered (Thomson and Mayo 1991:145). Shell production figures for KOP show that all through 1944 production, and therefore schedules, were on the rise (Table 8). To meet the rising schedules within the confines of the labor shortage required the development of new production methods.

In addition the successful innovations described above there was an aborted attempt to design a piece of equipment that, when finally developed elsewhere as the multiple volumetric loading machine, “was considered to be one of the greatest developments in the shell-loading industry, resulting in great savings in time, money, and manpower” (Thomson and Mayo 1991:138). The equipment would allow a full truck of shells to be automatically poured all at the same time, an idea that was probably being researched at many shell-loading facilities. The engineers noted that their main problem was in the valving mechanism they tried

¹⁵ “Regular” shells were drilled to accept point detonating fuzes—M48 or M51 for the 105-mm shell; deep-cavity shells were fitted with proximity fuzes—T80E6 for the 105-mm shell (Hogg 1978:62).

Table 8
Shell Production During 1944 and 1945 at Kansas Ordnance Plant, 900 and 1100 Areas

Type of Shell	April	June	August	October	December	February	April	June	August
75-mm with fuze	400,866	1,020							
75-mm deep cavity	91,742	137,756	164,560	306,840	194,688	105,192	86,912		
105-mm	122,596	444,188	488,795	316,077	496,913	536,131	568,058	501,038	
105-mm deep cavity								2,000	373,886
120-mm propelling charge	20,077	22,006					16,072		
120-mm deep cavity				25,108		10,068			
155-mm howitzer						41,216	24,761		
4.2-inch HE chemical mortar			257,193*	334,664	261,403	226,906			
4.5-inch						2,907			
not stated, probably 4.2-inch	_____	_____	_____	_____	_____	_____	284,677	303,618	158,466
TOTALS	635,281	604,970	910,548	982,689	1,004,288	911,969	939,647	806,656	532,352

* scheduled, as opposed to actual

Note: Increases in production reflected increased schedules handed down by the Ordnance Department, although schedules and production did not correspond exactly. These figures may not be complete, but they reflect all production figures for these items in the sources cited.

Sources: KOP [1945]:187, 191, 196, 199, 203, 205, 266, 269-270, 281.

to use to stop the flow of the explosive (KOP [1944]a:47). They had attempted to adapt a method of thermally controlling the flow from a method then in use at some ice plants (KOP [1944]a:51).

The machine was constructed of a number of cups constructed as a steam or hot-water jacketed unit with the bottom of each cup terminating in several small tubes surrounded by space for the heating medium. In operating cold water was introduced into the space surrounding the terminal tubes, the upper part of the cups being surrounded by hot water. TNT was allowed to crystallize [*sic*] in the small tubes—this was the valve closing action—and the cups were then filled with molten TNT. A skid of shells was then placed under the machine and hot water introduced in [the] space surrounding the small tubes, the crystalline TNT in the tubes melted, and the molten TNT in the cups flowed through the tubes into the shells. The time element required to complete this cycle together with difficulties experienced in obtaining even heating and cooling rates in all parts of the machine defeated the purpose (KOP [1944]a:47-50).

Other Ordnance Items

Only a few technological improvements in the bomb-loading process were mentioned in the historical record. In February 1945 the Ordnance Inspection Department approved a "hot-tube method" for use in the production of 1,000-pound bombs (KOP [1945]:275), so it seems the core melt unit was adapted for use in the 1100 Area. Little was also recorded concerning the 1200 Area and ammonium nitrate crystallization. Improvements were primarily related to the reduction of maintenance and damage due to stress and corrosion. These included lining the evaporating pans—made of cast iron, which cracked easily—with 16-gauge stainless steel (KOP [1944]a:70-72), modifying the neutral liquor storage tanks to allow grit to be removed, reducing the liquor temperature and flow speed to minimize corrosion, and improving the radiation of steam in the crystallizing units (KOP [1942]:32-33).

Significance of Equipment at the Kansas Ordnance Plant

Several pieces of equipment at KOP may be significant either on their own merit as historic objects or structures, as contributing elements of equipment setups, or as contributing components to buildings at the facility. The most important of these are the duplex pour units and the core melt units. Especially important would be the prototype of the core melt unit, the first to be developed in the country and an important contribution to shell-loading technology of the World War II era. Quite a lot of World War II-era equipment remains at the facility, and it is almost certain that core melt units from the period under investigation are yet extant (Grillot, personal communication 1995).

SOCIAL HISTORY—A WIDESPREAD IMPACT

At the end of May 1941, the *Parsons Sun* ran an article about an Office of Production Management report which said the tri-state region of Kansas, Missouri, and Oklahoma was destined to be the “powder magazine of the arsenal of democracy” (PS 1941a). The article quoted the report as saying that “there is no other area within the safe interior of the United States . . . where all the raw materials and facilities to produce strategic munitions, smokeless powder, TNT and ammonium nitrate are concentrated within a small area.” The Parsons Chamber of Commerce had already been at work trying to attract defense industry to the area for nearly a year when the article came out, having prepared a brief which they had submitted to the Ordnance Department in August of the previous year (VOX KOP 1942i).

Between August 1940 and April 1941, the military kept any plans they had for the Parsons area (see Figure 3) quiet. At least local newspapers carried no news of the possible success of the Chamber of Commerce’s actions until after Black and Veatch had completed the report on their survey of the area. Apparently there were not even any locals who knew the area had been surveyed. Then on 21 April, Kansas Representative Tom Walker announced that he had been informed a tract of 15,000 acres near Montana (see Figure 4) had been surveyed as a possible location for a shell-loading plant (*Oswego Democrat [OD]* 1941a). Although it was Walker that made the announcement, Senator Clyde M. Reed, whose hometown was Parsons, likely had the greater influence in Washington, D.C.¹⁶. One oral history interviewee felt that Senator Reed had considerable pull in the capital at that time (Oxford, interview 1995), and another that he was “instrumental” in the decision to locate the plant near Parsons (Larsen, interview 1995).

Labette County residents did not know for certain that they would see a defense industry their area until 2 June, when it was announced that President Roosevelt had authorized the construction of the facility, then speculated to cost \$35 million. The local reaction, realistic and somewhat doubtful of the long-term benefit to the area, was summed up by the *Parsons Sun*. “Horray [sic], we got it—but let’s keep our heads and don’t go hog-wild over a boom that will hurt later” (PS 1941b). Local restaurant owner Harold Cooper (interview 1995) agreed that the response was reserved—the people of Parsons “were more or less excited” but added that he personally thought “that would solve everything,” meaning, he explained, that it would do a lot to solve the unemployment and economic problems that then plagued the area.

Land Acquisition and Its Affects on the Local Population

The same week the announcement was made that the facility was to be built, the government appraisers set up an office in Parsons and began evaluating “about 125 pieces of property, including four schoolhouses and

¹⁶ Reed had earlier served as governor of Kansas, elected in 1928. He won the Senate seat in 1938, then was elected to a second term in 1944. That term was cut short by his death in 1949 (Thomas n.d.:3).

two cemeteries" (OD 1941b). Maps from the 1920s are reported to show that schools, churches, and about 100 farmsteads were located in the area at that time (Nickens and Associates 1984:7-1). Even more were originally included since the area survey by Black and Veatch covered 21,000 acres, a figure that was reduced to 17,200 acres (Figure 25) to exclude the Coursey Rendering Works and City of Parsons Sewage Treatment Plant. This site was primarily an undulating and gently rolling prairie (slopes averaging one percent), and included about 2,000 acres of the flood plain of Labette Creek on the west, as well as a small portion of the Neosho River flood plain on the east border. A ridge extended generally north to south through the center of the area, dividing the drainage of the two waterways. An abandoned rock quarry was located in the south central portion of the site. About 1,380 acres along the streams were lightly timbered with scrub oak, cottonwood, jack oak, elm, sycamore, locust, willow, walnut, hackberry, hickory, maple, pecan, and persimmon. About 5,520 acres were used as pasture (dairy and cattle feeding was extensively practiced); and 10,300 acres were under cultivation with wheat, corn, alfalfa, soy beans, lespedeza, flax, and clover. The Civilian Conservation Corps (CCC) had helped build terraces on about one-tenth of the site area (KOP [1944]b:2-6).

The government was able to acquire about 70 percent of the tracts by mutual agreement with the owners; the remaining tracts were either held by owners who were not willing to sell at the prices offered or had to be condemned to obtain a clear title (Ward 1941:40). Being displaced by the acquisition were 318 persons in 130 families. Forty-eight percent of the land was owned outright, eight percent by partial owners, and 44 percent was occupied by tenants, "about normal distribution between owner and tenant operations for this part of the state" (Ward 1941:41). By the end of June 1941, the effort to peaceably settle with all the owners was coming to a close, and a request was sent to the Assistant Attorney General, Lands Division of the Department of Justice, authorizing JMS to begin condemnation proceedings (War Department 1942:Exhibit 8).

At the beginning of the acquisition effort, it was estimated that the government would have to pay an average of \$30 per acre for the site, ranging from \$12 to \$60 per acre. The taxable value of the entire area, including buildings, was listed at \$452,470 (about \$25 per acre) in 1941, which the county tax office declared was a 100-percent valuation (KOP [1944]b:7). The average price paid per acre was actually nearly twice the original estimate, and several land owners objected to the low first offers they received from the government. Bert Quirk was offered \$52.50 per acre for his 160-acre farm with fairly extensive improvements. The widow of E.S. Edmonds was offered \$48.33 for 120 acres with a seven-room house, garage, barn, two brooder houses, milk house, and a hog house, an amount she claimed was "ridiculously low" since her husband had paid \$50 an acre 25 years previous¹⁷ (PS 1941d:1). Enough of the farmers were dissatisfied with the government's offers that a "protest" meeting held at a local rural schoolhouse in mid-July drew about 150 individuals, including Bert Quirk and Thurmond Edmonds, son of Ms. E.S. Edmonds. These two and another irate landowner, Ray Wilson, were assigned the task of drawing up a petition to express their position to the government (PS 1941f:1).

About 35 of the property owners, including the owners of the four schoolhouses, took their arguments to court, but the majority of the landowners settled amicably, although payment for these properties was "painfully slow" (PS 1941j:1). Recent interviews with local residents of the period indicate the farmers who vocalized their dissatisfaction may have been the exception more than the rule. Maxine Larsen (interview 1995) believed that her sister-in-law "got a good price" for their property there. Robert Oxford, who moved to the area in September 1941, never heard that anyone went to court over the offers and had the impression that most were given a fair price for their property (Oxford, interview 1995). And in August 1941, in an interview with the *Parsons Sun*, an unidentified woman who had to leave the area with her family said that

¹⁷ The average price of farm property for all of Kansas in 1940 was \$30 per acre, down from \$49 per acre in 1930 and \$62 in 1920 (Helyar 1993:385).

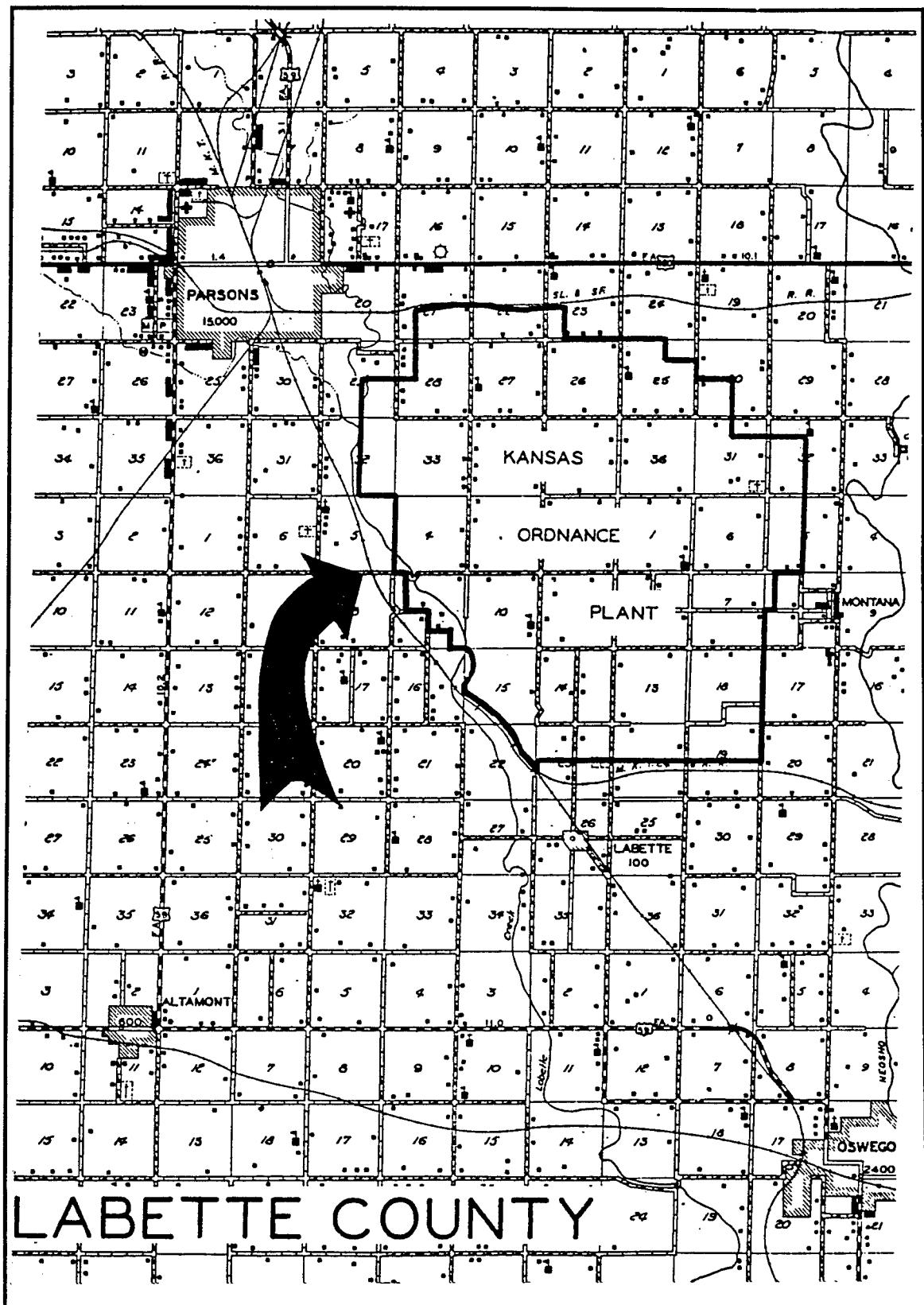


Figure 25. The KOP area, ca. 1940, showing the pre-installation structures (War Department ca. 1945).

they had "no fuss with the government" except that she had not been told definitely when to vacate. The article went on to say that such were "the feelings of many rural families" being moved from the area (*PS* 1941h).

Many of the final settlements were far above the \$30 estimated average. A sample of the prices paid is shown in Table 9, and the price ranges for all property settled up to October 1943 are shown in Table 10. At an average cost per acre of \$57.81 the land for the facility cost almost twice as much as originally expected, with the highest prices going to properties owned by the school districts. Land along the Neosho River was valued somewhat lower since it was unsuitable for agricultural purposes (KOP [1944]b:8).

Table 9
Final Acquisition Settlements for Sample Tracts at Kansas Ordnance Plant

Tract No.		Price per acre	Number of acres	Total
A2	P. Greenzweig et vir.	5.73	3.14****	18.00
A3	J. Gieringer	18.25	1.29***	24.00
A11	F.E. Grubelle	45.00**	160	7,200.00
A12	T.M. Flynn	50.00*	240	12,000.00
A14	W. Prideaux et ux.	27.50*	40	1,100.00
A19	I.M. Whetzel	40.00**	160	6,400.00
A27	E.L. Geiger	30.00*	80	2,400.00
A28	F.B. & A. Atterburn	37.69*	80	3,015.00
A31	G.O. Geiger, et al.	49.63**	320	15,880.00
A35	School District 55	800.00	1	800.00
A68	G.O. Geiger	38.00*	200	7,600.00
A74	E.L. Burris	45.00**	80	3,600.00
A86	M. Boecker	56.25**	40	2,250.00
B115	A.E. Lumm et ux.	59.94*	160	5,750.00
B125	W.W. Hiatt heirs	50.40*	40.18	2,025.00
B127	C. Leonard et ux.	31.25*	160	5,000.00
B134	A.B. Carter	62.50**	80	5,000.00
B138	E.A. Barrier	26.67**	30	800.00
B141	G.E. Wray	41.88*	160	6,700.00
B143	School District 17	735.00	1	735.00
B152	G.V. Elsworth et ux.	46.50**	370	17,205.00
B153	G.W. McConnell et ux.	93.33	30	2,818.00
B171	S. Addis	80.00	50	4,000.00
B177	M.A. Quirk	52.50*	160	8,400.00
B186	J.M. Piper	84.70	189.84	16,079.00

* Court-awarded prices, 22 August 1941, may have been later revised

** Court-awarded prices, 20 November 1942

*** Shown as .98 acres on War Department 1977

**** Shown as .981 on War Department 1977

Sources: KOP [1944]b:7-8; *OD* 1941e; *PS* 1942s; War Department 1977

Table 10
Per-Acre Price Ranges for the Acquisition of Property at Kansas Ordnance Plant

Value per acre	Number of tracts	Percent of area
1.00 to 20.00	4	3.101
20.00 to 30.00	20	15.503
30.00 to 40.00	44	34.11
40.00 to 50.00	33	25.581
50.00 to 60.00	15	11.627
60.00 to 70.00	2	1.55
70.00 to 80.00	3	2.326
80.00 to 90.00	3	2.326
90.00 to 100.00	1	0.775
100.00 and above	4	3.101

Source: KOP [1944]b:8

Property value assessment was a difficult task during the period when much of the land for World War II industrial facilities was being purchased. On the one hand, the Depression was still adversely affecting prices, lowering property values. Maxine Larsen said (interview 1995) that the area was "pretty depressed" up until the war and that her family had left their farm in the 1930s because they "couldn't make it," moving to Parsons where her father took whatever work he could find. Cooper's Cafe was selling hamburgers at five cents apiece; a competitor at three for 10 cents (Cooper, interview 1995). On the other hand, remuneration for land valued according to the situation during the 1930s would likely not be sufficient to purchase, or lease in the case of tenant occupation, comparable property in the 1940s. One family of five displaced by the government acquisition had rented the same 160-acre farm for 10 years. When notified they would need to vacate, they tried unsuccessfully to lease another farm in the area, eventually taking out a 90-day chattel mortgage on their farm equipment to pay for the effort. This was later extended by six months, and money to cover moving expenses was added.

Having no place to go when they received their 10-days-to-vacate notice, they decided to rent a temporary [then] location available, consisting of a house, small poultry house, dilapidated barn and six acre pasture. Realizing their inability to care for their livestock through the winter there, they held a public sale, retaining less than subsistence stock and applied the proceeds on their chattel indebtedness. The two girls have reentered school but the high school boy and his father are trying to secure work and must shortly apply for assistance unless they are successful. They have never previously received any kind of relief.

This family wants to continue farming and the FSA [Farm Security Administration] and [Kansas] Defense Relocation Corporation are trying to help them lease a farm for 1942. Though they succeed within a few months, they will have no fall seeded crops and will have to go considerably into debt to replace their equipment and livestock. Relocation from the defense area has seriously jeopardized this farm family's future (Ward 1941:87).

One of the area property owners dislocated by the construction lived with his wife and two children on an 80-acre farm, assessed at \$2,800. The family had asked for \$4,500 for the property but settled for the government's offer of \$3,500, thinking that the difference would not be worth the delay in payment that taking the matter to court would entail. However, they received no payment prior to vacating the property and had to sell a portion of their livestock and equipment to finance the move.

The husband is in poor health and unable to do manual labor. A substantial portion of the family income is from cheese, butter and other products the wife sells in Parsons. The FSA tried to relocate them near Parsons so they could retain this market, but there were no farms available. They are renting temporarily, 15 miles from Parsons; paying \$250 rent up to March 1 for [a] poor house and barn, pasture and lots.

They hoped to purchase a farm on which the wife could handle a large poultry enterprise and sell to a specialized market, but circumstances forced them to cull and sell $\frac{3}{4}$ of the 200-hen laying flock. The boy quit school and got a job to help the family. The girl missed three weeks of school, helping the family move. The father's age and poor health prevents him from getting defense employment. The family is much disturbed over their future. They have not been reimbursed for their crops or land and have not found a place to rent [long-term] and have sold so much of their livestock and poultry that it would be impossible to operate any fair sized farm the coming year. They feel the Ordnance plant has taken their home and has jeopardized their entire future (Ward 1941:90).

The Kansas Defense Relocation Corporation mentioned above assisted Kansas farmers needing to relocate by helping them find new places to live, or temporary homes if no others were available, and bought land to sell or lease to displaced families (Ward 1941:38, 45). In a report documenting its work during the period, the Kansas Defense Relocation Corporation stated that the problem of relocation was exacerbated by the length of time it took for the government to pay owners for their land. "Some owners, who had made a small down payment and had an option to purchase farms elsewhere, have not received payment for their former farms at the time the options expired on the new farms, and in some instances have lost the down payments or have had the prices of the new farms raised" (Ward 1941:39).

By November 1941, 32 of the former farmers on KOP-site properties had bought new farms "with an average reduction in size of 50 acres per farm. As the owner-families only average $2\frac{1}{2}$ persons per family, and the average size of the new farm is nearly a quarter-section, these new farms are undoubtedly still family size farms" (Ward 1941:43). Former tenants had more problems. To that date, only seven had relocated, on farms averaging 27 acres smaller than those they had rented on the KOP property. The tenant families were larger, averaging $3\frac{1}{3}$ members, but their farmsteads averaged less than a quarter section even before they were moved from the KOP construction site.

This acreage reduction is rather serious and may mean that these families are on less than family size farms. While nearly 50% of the farmer owners have been able to relocate from the Parsons area, only 13% of the tenants have, so far, been able to find new locations. It is very evident that tenants are having much greater difficulties in relocation than are former owners (Ward 1941:43).

Former Structures at the Facility

It seems that the government purchased most or all of the structures on the property with the land. Some of these were later sold, others continued to be used by the parties constructing and operating the facility during the ensuing years. Comprehensive documentation of the fates of pre-installation structures was not located during the course of this research¹⁸.

¹⁸ In a plant history written in 1944, reference was made to the *History of the Kansas Ordnance Plant*From Agriculture to Ammunition Loading. Historical Report June*Sept. 1943 [sic]* which "fully discussed" the disposition of farm buildings. Copies of this document were sent to the Office of the Chief of Ordnance and to the FDAP (KOP [1944]b:9, footnote 7). Although the most important Office of the Chief of Ordnance information was researched at the National Archives and Records Administration holdings, limited time meant the archivists could not have every box containing KOP material pulled. Further research into these documents and those of the FDAP, St. Louis District, may locate this document.

In areas where the farm buildings were razed, the sites were "usually entirely obliterated . . . so that within a year or two it was extremely difficult for even former residents to find their own former places of abode" (KOP [1944]b:9). This was true even in areas where there would be no installation-related construction, although some foundations and basements were left somewhat intact and in at least three cases cow sheds and outbuildings were left standing. Many structures not initially demolished served as offices during construction (Table 11), then were sold and removed. Others remained at the facility for a longer period of time (KOP [1944]b:10), some being sold by the Salvage Department in the second quarter of 1943 (KOP [1944]b:14).

Some of the buildings still on the grounds when the government acquired the property were sold by sealed bid shortly before construction (PS 1944c). Little documentation revealing the final disposal of most structures remaining at the facility during early operations has been located, but previous research indicates there are currently no remaining structures that date prior to the construction of the World War II facility. The Franklin and Fairview cemeteries, which contain graves dating back to 1871, are still located within the borders of the facility (HABS/HAER 1984:15-16).

War-time Agriculture on the KOP Property

In addition to the structures discussed above, the government also acquired land that had been developed for agricultural uses, and crops as well in some cases. In 1941, neither JMS nor the government harvested the crops abandoned by the previous owners. Some farmers received permission to harvest at the facility, but most were either not interested or had moved too far away. Weeds were already overrunning some sites by late in the summer of 1941 (KOP [1944]b:25-26). The CCC began sodding former farms on a limited basis in April 1942 (KOP [1944]b:12-15), an effort that was halted the following month when the Ordnance Department requested that JMS "use all vacant [sic] areas on the project in order that crop production might be increased and the war effort thereby aided" (KOP [1944]b:21-22). The agent-operator had the option to lease land to outside persons, but decided to raise alfalfa and lespedeza itself (KOP [1944]b:21). About \$75,000 worth of farm equipment was purchased, additional personnel were hired, and the crops that year were sold for almost \$10,000 (KOP [1944]b:24, 27, 49). There were many fruit trees and berry bushes growing on the old farmsteads, which the Ordnance Property Officer tried to have harvested in 1942. But because of low quality and a lack of spraying, none were harvested that year. Due to the food shortage the following year, regulations on employees gathering these products were relaxed. Since no one was taking care of these trees and bushes, most were by then in poor condition (KOP [1944]b:35-36).

In part because of a change in Ordnance Department accounting requirements, JMS decided in October 1943 to lease land to local farmers rather than use its own employees for farm work (KOP [1944]b:37). One tract, 160 acres of the old Flynn farm, including its residence and outbuildings, had been leased and occupied by the lessee since March 1942, but the operators were not very happy with the experiment. Although JMS had expected to be able to purchase vegetables from the lessee, no crops were raised—only a few head of livestock were grazed. The farming activities record states that local farmers were encouraged to lease land throughout 1943 (KOP [1944]b:46), but it is not known how many acted on the encouragement or how enthusiastic that encouragement was. The record is somewhat clearer after November 1943, when about 4,500 acres were declared excess and available for lease (KOP [1944]b:46). The 34 tracts put up for lease were spread along the west boundary of the plant and around the southeast corner (PS 1943c). Additional acreage was put up for lease in early 1944, and by the end of March it appears that bids had been accepted for the lease of all but about 975 acres (KOP [1944]b:48). The effort to farm the nonindustrial land was more trouble than it was worth, though, and after a third-quarter 1944 assessment of the farming endeavor, it was "definitely concluded by this department that it would be to the advantage of the Government if farming operations as such would cease at this plant" (KOP [1944]d:46). This halt to farming did not include the few Victory Gardens worked by plant employees or the logging that was allowed, most likely on a limited scale (KOP [1944]d:60-61).

Table 11
Pre-Installation Structures Formerly at the Kansas Ordnance Plant

Owner	Tract	Acreage	Description and Fate
William H. or Samuel G. Baker	A41	80	The residence on what was known as the Baker farm was left standing and noted to have been used as a High Explosives Storage (1500 Area) office.
	A42	80	However, these tracts were closer to the 1700 Area, where fuzes and boosters were stored, and could have been an office for that area instead. It is not known when nor how this building was destroyed.
C.A. Black	B174	240	The house was moved to Oswego in December 1941 by Frank Farris. He was to use it as a rental property.
Joseph L. Brown*	B193	320	All of the buildings on the Brown farm were left standing except a cellar and garage. It is not clear whether a note that "the farm was not occupied" (KOP [1944]b:9) referred to the pre-installation era or not, but in November 1942 the house was "scarcely worthy of repair" (VOX KOP 1942j:5). It is not known when nor how these buildings were destroyed.
J.L. Cannard	B123	80	The residence for the Cannard farm was used as an Infirmary, then as a first aid station, and finally for the storage of grains produced in the area (Tract B123 is in the 1500 Area, but the structure could have been moved). It was constructed at least partly of red brick, was "one of the better built homes" remaining on the facility (VOX KOP 1942j:5), and it may have been this same structure that was also referred to as the "Brownstone Siding, Brick [sic] house formerly used as the First Aid Station," where seed was later screened, cleaned and stored (KOP [1944]b:32). It is not known when nor how this building was destroyed.
T.M. Flynn	A12	240	All of the buildings associated with the Flynn farm were left intact throughout early operations, the house in good enough condition to be used as a residence. In the spring of 1942 it was leased to an individual. It is not known when nor how these buildings were destroyed.
Thomas E. Howey	A25	80	The house was first used as a Transportation and Stores Department office (perhaps during construction) and as the headquarters of the KOP taxi service, then stood vacant for eight months before being converted into a Fire Station. This building may have been the same as what was called the White House, which was located near the tracts of the St. Louis & San Francisco Railroad. The barn associated with the White House was used to store hay harvested from the Administration Area. It is not known when nor how these buildings were destroyed. It is not very likely that this building is either of the fire stations (buildings 52 and 53) listed in the <i>Industrial Facilities Inventory</i> for KOP. There is some chance that this was Building 163, which Larry Grillot recalled may have been used as a fire station. That building was destroyed several years ago (Grillot, personal communication 1995).
E. Hunter	B178	80	A seven-room building was purchased by Frank Farris and moved to the corner of Eighth Street and Merchant, in Oswego.
J.M. Piper	B172 B186	160 or 189.84	The two-story residence was moved to Oswego in November 1942 (the house was cut into two sections, the bottom story moved first, the second

Table 11 (cont'd)

Owner	Tract	Acreage	Description and Fate
following). The barn, noted to have been one of the largest barns in southeast Kansas, was left standing and later used to store most of the hay produced at the facility. "Mr. Piper was a mule raiser and the barn, which is 100 feet by 150 feet, is supported with native lumber. All stanchions and upper floors have been removed so that this huge structure will shelter several hundred tons of hay" (<i>VOX KOP</i> 1942j:5). A "false floor" was added over the original dirt floor in late 1942 or early 1943 to prevent the spoilage of the hay. A tornado tore the roof off in the spring of 1944. The structure was sold in June 1944 to Al Hayes, of Chetopa, Kansas, who was to tear down the building to salvage the lumber. A 50- x 130-foot lean-to on the south side was not included in the sale (<i>PS</i> 1944c). The lean-to may have been an addition by JMS. James Gerdes (interview 1995) remembered the barn being burned as a training exercise for fire department employees—this could have been the lean-to or some other structure formerly part of the Piper farm.			
Jesse A Winters	A9	40	The house was left standing and used as a training school. It was sold in 1943 and removed from the property.
"Red" School House	?	?	This building was one of the four schoolhouses located within the plant boundaries, and the only one not removed before construction began. It was used by the Salvage Department, probably as an office. It is not known when nor how this building was destroyed.
?	?	?	One house was reported to have been converted into an office for the 1900 Area. This may have been referring to a structure on either the Brown or Baker farm.
?	?	?	Five silos in unknown locations, made of hollow clay tile cemented together, were not razed during initial construction and operations. The structures were damaged somewhat by an unsuccessful attempt to salvage the tiles, but were still largely intact in 1942. It is not known when nor how they were destroyed.

* A Dallas C. Brown also owned land in the area, the 80 acres of Tract B179, on the west side of the facility. However, the barn associated with the Brown farm was reported to have been two miles east of the Piper barn (*VOX KOP* 1942j:5), indicating the most likely owner of the Brown farm mentioned here to be Joseph L. Brown.

Note: Oswego banker Frank Farris and veterinarian Dr. James Fredrick Thomas moved several houses from the plant area into Oswego (Barker, personal communication 1995). By the end of September 1941, more than 25 houses had been sold by the government and moved out of the plant area. The highest price paid was \$705, the average price \$400. Seven of these had been moved to Oswego, four to Parsons, four to the town of Labette, about four to Altamont, the remainder to rural areas (*PS* 1941i).

Sources: *KOP* [1944]b:9-10, 39, 44; *OD* 1941h; *OD* 1941f; *VOX KOP* 1942j; *VOX KOP* 1942i:9; War Department 1977

A Small Boom For Parsons

The Planning Branch had hoped to spread industrialization to rural America with the implementation of the GOCO Industrial Facilities mobilization program. In some areas, construction and operations of the facilities were too much too quickly. The price of industrializing rural areas could overwhelm small rural communities with limited means of providing basic services for the large number of people that supported

the new industry. The population of Charlestown, Indiana, tripled when construction started on the nearby Indiana Ordnance Works, placing a tremendous strain on the town (Gaither 1995:103, 111-117). And GOCO facilities built near New Brighton, Minnesota; Baraboo, Wisconsin; and Rosemount, Minnesota, caused housing shortages, price increases, and an adverse impact on utility systems (Dooley 1985:225-227).

But the impact on Parsons was less severe than it was at those locales. Newcomers to the area looked for accommodations in not only Parsons but all over Labette County and the surrounding area, spreading all aspects of the impact over a broader base. Parsons was nearest the entrance to the plant, but Oswego, the county seat, was only a few miles farther distant—bus service was available between the plant and Independence, Coffeyville, and Pittsburg throughout most of the operations period and perhaps during the construction period as well. And Parsonians were used to outsiders migrating to the area for work and passing through on business because Parsons had been home to the head office of the MK&T railroad since 1891.

In fact, Parsons owes its founding to the railroads that pushed through the area in the early 1870s. It was named after Judge Levi G. Parsons, who along with several associates was setting up the MK&T Railway Company (known locally as the Katy Railroad). The town was laid out by Judge Parsons' "right-hand-man," Colonel Robert S. Stevens, at the junction of an MK&T line from Sedalia, Missouri, and a line of the Southern Branch of the Union Pacific as soon as the location of that junction was determined. Parsons is generally accepted as being formally founded on 8 March 1871; it grew quickly, and by 1885 had a population of almost 7,300. In 1891, the general offices of the MK&T were moved to Parsons, where they were located until 1957 (Thomas n.d.:1-2).

The percentage of the Kansas population living in southeast Kansas began declining in 1910, and the total number of residents in that area began declining in 1920 (Lujan 1974:7). Even during the years KOP was in operation, the Labette County population remained relatively stable, the largest increase in 1942 when the population rose to 32,589 from its 1941 level of 28,877. (From 1942 through 1948 the population fluctuated between 31,000 and 32,000 [Breckenridge ca. 1952:78; Kansas State Board of Agriculture (KSBOA) 1940:374; KSBOA 1942:354; KSBOA 1944:274].) The population of Parsons reflected that of the county, rising and falling with the greater area (Breckenridge ca. 1952:4). Industry in Labette County included the mining of coal and production of oil and gas, and the quarrying of limestone (Breckenridge ca. 1952:16-19). Manufacturing concerns included Ankortite (producing building materials for use with reinforced concrete), a Beatrice Foods milk plant (Breckenridge ca. 1952:43), as well as an egg-breaking plant perhaps called the Parsons Poultry Company (Habiger, interview 1995) or Swift Company (Cooper, interview 1995). By 1940, a fairly large percentage of Labette County residents were working for the railroad—14.3 percent, as opposed to 17.5 percent in trade, 17.2 percent in services, and 31.1 percent in agriculture (Macy et al. 1970:19). Other major employers in the area included the Parsons State Hospital and Training Center, established early this century, and the educational system (Thomas n.d.:3).

When Harold Cooper moved to Parsons in 1929, he felt it was "a pretty nice little town, more or less prosperous" due in large part to the railroad, the main employer (Cooper, interview 1995). But with the Depression harder times came to the town and the surrounding area, then a "picture of drought, low yields, low prices and very meager incomes" for farmers in the region (Larsen, interview 1995; Ward 1941:5). Josephine Habiger worked at the egg-breaking plant during the latter 1930s for \$1 a day, where she had a quota to meet or lose her job to one of many willing to take her place (interview 1995). The alleviation of some of the Depression-era problems preceded the arrival of KOP—"farmers in this region generally, are experiencing the best yields of the last 15 years, and the best prices for their products that they have realized in many years" (Ward 1941:5).

Soon after the announcement that a shell-loading plant was definitely coming to the area, Parsons' mayor and other municipal leaders visited Burlington, where the Iowa Ordnance Plant was nine months into construction, to see what the could expect to soon see in Parsons. Traffic and housing problems were

"greatly increased" there, and "boom prices prevail[ed] . . . for houses, rooms and apartments, but other prices, particularly of food," had changed little. Retail business was also up an average of 40 percent over the previous year (*OD* 1941c). It was possibly in response to this information that both Parsons and Oswego conducted surveys of the available living space in the area in July (*OD* 1941d; *PS* 1941e).

The construction workers who soon came to the area included many with little or no previous experience in construction (Voight 1945:161). Robert Oxford, by contrast, was an experienced carpenter who had also worked on construction at Fort Leonard Wood, Missouri. He moved to Labette County from Kansas City in September 1941. He agreed that many of the people hired for construction had limited carpentry skills, and said that over half were local farmers who continued to care for their farms while working at the KOP site. He also said that because the carpenters usually worked in crews, there was always someone around to ask if a person did not know how to do something, filling in gaps in knowledge, so that one did not have to be a professional carpenter to work during construction. The same was not true during operations, when the carpenters and other craftspersons in the Maintenance Department worked more independently. Oxford also noted that although all carpenters at the construction site were supposed to belong to the union, as he did, it was quite possible to be hired without joining (Oxford, interview 1995).

Peak employment during construction was between 10,000 to 12,000 (*KOP* [1945]:101). Interviewees living there at the time said the workers came from all over, but in elaborating with specifics they mentioned towns and cities like Miami, Oklahoma; Joplin, Missouri (Larsen, interview 1995); and Kansas City, Pittsburg, and Coffeyville, Kansas (Gerdes, interview 1995). The population figures for the period—at the county level, 28,877 in 1941 and 32,589 in 1942—do not reflect a population increase equivalent to the level of employment possibly because so many of the construction workers were local residents or lived close enough to commute. And, workers may have not yet arrived or already left when these counts were taken¹⁹. Whatever the increase in the population, housing was difficult to find during construction. A housing survey conducted by the Parsons Chamber of Commerce found that there were rooms, apartments, and houses enough to accommodate 5,000 new residents in that city alone (*PS* 1941e), but that figure may have been overly optimistic. Harold and Opal Cooper (interview 1995) said that housing was tight in Parsons before construction started and that it had always been difficult to find a place to live. Robert Oxford moved to the town in 1941 and said that "you couldn't hardly find a place" to stay (interview 1995). There was a big demand for all kinds of living space—people were "fixing their attics and their basements and everything else up and renting them out" (Oxford, interview 1995). Many trailer camps also sprang up (Larsen, interview 1995). Regulations for the camps were developed based on those in effect in Burlington, Iowa (as a result of the construction and operations of the Iowa Ordnance Plant), and in effect by mid-August 1941. These set minimum standards for toilet and bathing facilities, water supplies, spacing between the trailers, and other similar health and comfort issues (*PS* 1941g:1).

Josephine Habiger added that the increase in the population of Parsons was noticeable, but that many workers found places to live in Pittsburg, Independence, and Oswego (interview 1995). Private interests helped solve the housing shortage by renting rooms and beds to the newcomers. Restaurants and "hamburger places" were located "all over town" (Larsen, interview 1995) to feed the workers, one of which was Cooper's Cafe:

This plant just kind of came on us all at once, nobody expected it. And business started picking up, . . . course you had to pay the employees more to keep them because they had the opportunities to work at the plant. I don't know, I don't think that I was experienced enough at that time to raise my prices along with everything else. Anyway, we didn't make a whole lot more money during the plant-building and all than we did at normal times. . . . Prices could have been jacked up a little more than they were. Let

¹⁹ County Clerk W.A. Dearth estimated the population in January 1942 would have been between 37,000 and 38,000. He felt that approximately 75 percent of the construction workers had left the area by the time the 1942 assessment was taken (*PS* 1942m).

the overhead just get out of line a little. . . . We were working so, so many hours and what-not that you didn't realize you had any competition (Cooper, interview 1995).

Entertainment for the workers was varied. Maxine Larsen (interview 1995) said she did not know too much about what the workers did for entertainment—"I was only 19 years and I probably didn't associate with the contract people, because they were a wild bunch." There were several movie theaters in Parsons, and younger people went to the drugstores for sodas with friends. There were also lodges, the Elks and Eagles and their ilk, that held Saturday night dances. Gambling rooms were not uncommon, and there were several night clubs and plenty of bootleg liquor—as well as the accompanying fights and brawls (Larsen, interview 1995). Robert Oxford (interview 1995) elaborated on this type of entertainment. "You take . . . transient people, they want something to do, you know. . . . Anytime you get that kind of people, you get some pretty rough people." These were the ones who did most of the gambling, which at that time meant playing dominoes and poker (Oxford, interview 1995). Or sometimes gambling during their lunch hour, shooting dice in a corner (Gerdes, interview 1995). The county made sporadic efforts to eliminate gambling and the sale of illegal liquor (*PS* 1941k:1-2; *PS* 1942h).

Local reaction to this new industry in Labette County was mixed. The war industry in general may have been associated with the easing of the Depression in the minds of some. Farmers' yields were at a 15-year high, and the prices of agricultural products were also at record high levels (Ward 1941:5). But Kansas was a stronghold of isolationism in the U.S. prior to Pearl Harbor (Davis 1976:196), and the Parsons area was no exception—"a lot of your old-timers just thought we should stay out of it [the war]" (Larsen, interview 1995)—so regardless of the economic benefits, it is likely that many Kansans were uneasy about this new scope of international involvement. James Gerdes mentioned that the minister and trustees of the Coffeyville church he attended in 1939 circulated a document that they wanted the young men to sign, pledging that in the event of a war they would not serve. Some signed, but he did not. "I thought of my grandpa," who had been shot in the hip and crippled while serving in the Civil War. "I thought, 'No, he fought for his country, I will'" (Gerdes, interview 1995).

The reactions to the newcomers tended toward the negative. Larsen (interview 1995) believed many old-timers resented the newcomers. "I know they did. Those people that, you know, they had their jobs, and their homes, and of course a lot of . . . they would consider them transients came to Parsons. I'm sure they were resented among the people that were here before." The attitude toward those in management, however, was more accepting, she added. Gerdes (interview 1995) remembered that the locals treated the newcomers "like dirt. . . . Just certain ones, the renters." He mentioned a few reasons for this, including the fact that so many workers were so often covered with mud due to the wet conditions at the construction site. Locals also "weren't very friendly [to the newcomers]. . . . They just didn't, didn't think they'd stick around. . . . Some of the old ladies around here, they would act like they were kind of afraid of the newcomers . . . there's so many of them!" Businesses also gave them cool receptions at times. According to Gerdes, "the saying was that when you went to borrow money at the bank, if you didn't smell like cow manure [that is, if you were not a farmer] you couldn't get a loan." Retailers were more willing to do business with the people from out of town. The Christmas gift-buying season was the best in history for Parsons' merchants, with receipts 25 percent over those of the previous year (*PS* 1941l).

The establishment of the county's first health unit was prompted by the coming of the munitions facility. It was located in Parsons, opened at the end of January or beginning of February 1942 (*PS* 1942e), and in addition to providing health care would conduct inspections of restaurants and dairies in the county (*PS* 1941c:1-2). And Parsons considered enacting a new refuse collection ordinance to replace the informal system whereby local farmers collected garbage for their hogs (*PS* 1942a).

The number of children attending Parsons schools during the 1941-1942 school year increased by just over 400 (*VOX KOP* 1942b), but this figure may have been higher had so many high school and junior college students not quit school to go to work (*PS* 1942g). There was no indication that this increase required the

school board to take special measures. The year previous, \$4,000 had been included in the budget for new buildings and \$500 for free textbooks (Board of Education, Parsons, Kansas [BOE] [1951]:126-127), which may have inadvertently prepared the school district for the new students. Construction of KOP took place during the 1941-1942 school year, when \$3,000 was allotted for new construction and \$150 for texts (BOE [1951]:159-160). During the summer that the 1941-1942 budget was being prepared, the school board also decided that there would be a need for "a new Washington elementary school building and a new West Junior High School building, in the near future." Rather than undertake these projects themselves, the board filed with the WPA to try to have them build the new structures (BOE [1951]:155).

There are several additional areas in which the construction-era population increase could have adversely affected the people of Parsons and other communities in Labette County. The sewage system and town and county utility systems could have been overburdened with higher usages; roads and other means of travel may have become overly crowded, and parking difficult; crime could have increased, and the attendant personnel in the law enforcement and judicial systems overworked. And the housing situation could have been much worse than it seems to have been. The picture of construction-era impact in other communities where GOCO industrial facilities were built was in some cases much darker than that of Parsons and Labette County (Dooley 1985:225-228; Gaither 1995:103-123). But since little concerning such negative impacts was found in the newspapers and historical documents from the period, these communities seem to have weathered the population influx quite well. Concerning the positive effects of construction, business at local banks trebled and postal receipts doubled (*PS* 1942g), both indicating business activity in the area had substantially increased.

The Limited Impact of Operations

The boom, such as it was, seems to have subsided after the construction period. At Cooper's Cafe, "we were just kind of snowed under for a quite a while, until all at once it just, it stopped and that was the end of it. It seemed like more of the business was from out of town, people that, that just left. . . . The bottom fell out of it" (Cooper, interview 1995). Another restaurant, the Newcastle, which had opened at the beginning of construction, moved north to Chanute after operations began (Cooper, interview 1995). Over the wider area, the boom may have been prolonged somewhat, but since the operations employees were spread over not only Labette County but surrounding counties as well, the continuing impact should probably be termed an improvement in the economy of the area rather than a boom. If the April 1942 *Parsons Sun* (1942j) headlines that read "Commuters Can Move Here Now!" are any indication, the city even seems to have been trying to draw more people to the area at the close of construction. According to Harold Cooper (interview 1995), it was not very successful. He felt Parsons never was home to a very large percentage of plant employees. As early as November 1941, the *Oswego Democrat* ran the comments of a local citizen and restaurant owner who alleged that "the 'boom' has fizzled off like a wet fuse as far as Oswego is concerned. Oswego has all the business and all the people right now that it will ever get, . . . and the trailer camps here are flops" (*OD* 1941g).

Employment at the facility fluctuated with the schedules for production handed down from the Ordnance Department. The first operations-era employees to work for JMS were the guards, first hired during construction. A recruitment program was initiated near the end of 1941 that "covered the entire area of southeastern and southwestern Kansas, extending as far [south] as Topeka, Kansas, and as far east as Joplin, Missouri" (KOP [1945]:118). Most future recruitment would be conducted in the same general area but, as with the guards, a higher percentage of the employees were found in the vicinity of the plant. And as with later employees, the guards "came from all types of occupations—some were barbers, carpenters, oil field workers, etc.—very few had any law-enforcement experience" (KOP [1945]:120). In hiring personnel for the Inspection Department in early 1942, JMS looked for former salesmen and automobile production employees. At that time

there were very few men available with a past experience on [sic] ammunition loading. The men available, in this area and nearby, consisted mostly of salesmen whose positions had been eliminated by the war and a few Ford and Chevrolet employees from the Kansas City Area. As a general run, we found that the salesmen from various concerns such as Singer Sewing Machine, Maytag Washer, etc. could be used on the back lines doing such work as inspecting fuzes, boosters, etc.—the one drawback to their past experience was no production background. Every effort was made to contact inspectors from Chevrolet and Ford who would consider coming to Parsons. These men, as a whole, had many years of production experience behind them and were mature enough to be given supervisory responsibility. Training of these new employees for inspection work was started in the middle of January, 1943 (KOP [1945]:138).

Pay for JMS employees other than management ranged from 60 cents to \$1.05 per hour, increasing in five-cent increments (KOP [1945]:21). A comprehensive job evaluation procedure was worked out in an effort to “prevent inequalities in payments for similar work within the factory and to eliminate sources of individual dissatisfaction concerning the wages and work”; to establish a basis for wage arbitration; and to establish criteria for promotion (J-M Service Corporation [JMS] n.d.:1). Positions were evaluated according to levels of mental aptitude, skill, responsibility, and physical strength required, and the working conditions under which tasks would be carried out. Evaluation points were then determined, more points being awarded for positions that placed greater demands on the workers.

Mental Requirements	0-200
Skill	0-375
Responsibility	0-225
Working Conditions	0-200
Physical Requirements	0-100

These evaluation points were used “in order to divorce the mind from any pre-conceived monetary value. When the evaluation was completed, it meant that a job which had been evaluated at 800 points would receive more than one evaluated at 600 points” (KOP [1942]:89). After wages were estimated for a range of positions, determined by the wages paid for similar positions at other GOCO facilities, the evaluation points were used to determine wages above the base of 60 cents per hour (KOP [1942]:88-89), thus in theory eliminating the assessors’ ideas about the value of the various positions. Under this system, for example, in August 1945 the “working leader” in Building 1104 was paid 85 cents per hour, line operators 60 to 70 cents per hour, and equipment operators 80 cents per hour. All employees in the building were then women (including the working leader and equipment operators) except one line operator, who lifted boxes of inert 4.2-inch shells to a table (KOP [1945]:attachment to 26).

There were three major efforts to provide housing for plant employees. The first was on the grounds of the facility itself, where eight dormitories (five for men, three for women) were built. Each had 160 rooms, for a total capacity of 1,280 persons, and they were opened in September 1942 (KOP [1942]:15, 117; KOP [1945]:53-54). Rooms on the first floor rented for \$3.00 per week, those on the second floor for \$3.25. Each dormitory had “extensive bathing and toilet facilities, . . . kept neat and clean at all times by an adequate staff,” and the rooms were all “equipped with desk-dressers, [and] wardrobe pieces having one drawer front which drops down to form a desk. Simmons beds in each of the rooms will be equipped with the finest innerspring [sic] mattresses” (VOX KOP 1942a:1). JMS management expected heavy use of the dormitories (KOP [1945]:54), but occupancy averaged about 13 percent of capacity. Peak occupancy was seen in January 1945, when soldiers from Camp Crowder, Missouri, who were temporarily working at the plant, were housed there, bringing usage up to 34 percent of capacity, or 502 occupants (KOP [1945]:56, 58). JMS personnel in charge of the dormitories felt there were four reasons for the low occupancy: employment at the facility reached only half that of original expectations, the rooms were too small, there were no multiple-room units, and “people in this locality do not lend themselves well to mass housing” (KOP

[1945]:54). In July 1943, after being open less than a year, the furnishings for approximately two-thirds of the rooms were listed as excess and shipped to other facilities (KOP [1945]:55).

For the first four months they were open, the dormitories were available to whites only. But in January 1943, "it was deemed advisable by the Management to open Dormitory 127 for use by colored women and Dormitory 130 for use by colored men" (KOP [1945]:55). The black men's dormitory was closed some time prior to August 1944, but with increasing demands for rooms in the buildings, it was again opened to blacks that month. In September there were four dormitories in use, one each for black and white males and females (KOP [1945]:160). The dormitories continued to be open to blacks for the remainder of the war (KOP [1945]:54-55).

The second major effort to house workers was a federally funded trailer camp. The camp for trailers was approved in the fall of 1941 and expanded to incorporate 400 trailers in January 1942. Administered by the Farm Security Administration, the camp was set up on 40 acres east of Parsons leased by the government; the camp included "two laundry units and six utility trailers" (Parsons Historical Museum 1943). Work on the project did not begin until January, but a large number of trailers were then on location and ready to be placed on the land as soon as utilities were laid (PS 1942b; PS 1942c). When a February rumor circulated that the camp would be closed at the end of construction, the government announced that it would remain as long as needed (PS 1942f:1), but that was only about one year thereafter. As the shortage of housing eased there was less need for the trailers, and in February 1943 all but 109 trailers were moved out of the camp, most to Tucson, Arizona (KOP [1943]a:40; Parsons Historical Museum 1943). In April the remaining trailers were being moved out, "and only those ill or those unable to find living quarters [elsewhere] were still there" (KOP [1944]b:132).

The third and most important effort to house KOP employees was the Winway Demountable House Project, or the Winway Addition, a federally funded housing project also administered by the Farm Security Administration and announced the day after the trailer camp was expanded to incorporate 400 trailers, in January 1942 (PS 1942b; PS 1942c). The prefabricated modular houses were built on a 75-acre tract on the southeast side of Parsons. Although approved in early 1942, work did not get underway until 16 July, apparently due to problems finding contractors to do the excavation work. The Johns-Manville Corporation was hired to build the units, which were shipped to Parsons in sections (PS 1942c). The Grimshaw Construction Company, from Tulsa, Oklahoma, was hired to erect the structures, which they expected to be able to do at a rate of 10 per day (VOX KOP 1942f). Late in 1942, Grimshaw Construction was also awarded the contract to install the utilities (PS 1942r:1). Winway was planned with 56 one-bedroom, 240 two-bedroom, and 104 three-bedroom units, 85 percent of which were built as duplexes, all having concrete block pier foundations (PS 1942n). All of these were to be reserved for war industry workers (PS 1942c).

By the end of April, fewer units were completed than had been planned, but the first units were available for rent on the fifteenth of the month. The new competition for tenants caused rents in Parsons to decrease by about \$10 per month. By the end of the April, only 47 of the Winway units had been rented, and a ruling by the Office of War Utilities that telephones could not be installed there caused many prospective residents to look elsewhere (KOP [1944]b:132, 243). By the fall of 1943, occupancy had been opened up to employees of the MK&T railroad, the Blue Valley Creamery, and Bell Telephone, but only about 165 units were occupied at the end of the year (KOP [1944]a:Schedule 4:18). Telephone installations were finally approved in January 1944, but occupancy did not increase much because many residents were then being called by the draft board. In February, plans were made to move 102 units to another war production area (KOP [1944]b:243).

To provide transportation for the operations employees, JMS managers tried to persuade established bus companies in the area to begin serving the facility, but the bus companies would not agree to provide services for all three shifts. Instead, JMS was able to persuade local automobile dealers to establish the necessary transportation services. "This was prior to gasoline and tire rationing, and as the people in this section of

the country were in the habit of using private automobiles for the[ir] transportation needs, it was very difficult to interest anyone in establishing bus service" (KOP [1945]:106). The routes included stops at the various change houses in the production areas, which meant JMS purchased less equipment and provided fewer personnel for intraplant transportation (KOP [1945]:106-107). JMS did provide buses to carry dormitory residents to and from their work stations (KOP [1945]:56). These were probably 100-passenger buses acquired in the summer or fall of 1942, the "largest ever seen in this region" (PS 1942t). After gasoline began being rationed, the local rationing board refused to grant coupons to many applicants who claimed they needed them to drive to and from work as a means of encouraging the use of public transportation—"they were anxious to keep the various buses full to capacity" (KOP [1944]a:3). During the highest period of activity, 10 companies had a total of 72 buses serving the facility, transporting 32 percent of the work force and covering almost 6,000 miles a day. One of these company owners "operated from March 1, 1942 to July 31, 1945 without an injury to a single passenger. During this period his buses made 10,563 trips, carried 285,538 passengers for a total of 446,823 miles. Ice, snow and floods caused his buses to be late only three times and forced him to cancel only four trips" (KOP [1945]:106-107).

Car pooling was encouraged among those who did not take the bus—Josephine Habiger (interview 1995) said she had to carry passengers to get rationing coupons. And the Industrial Relations Department would help employees find transportation to and from work if they so desired (KOP [1942]:117). About 64 percent of the employees traveled to work in up to 1,562 private automobiles, at an average of 4.5 persons per auto. To accommodate their needs, the Rationing Panel at KOP issued 8,500 tires and enough gasoline rationing coupons to have allowed a single car to have been driven 48 million miles (KOP [1945]:106-107).

Peak employment at KOP was not reached until January 1945, when 7,358 employees were on the rolls. Throughout the war, a total of 25,673 people, out of an estimated 40,000 applicants, were hired to work at the facility (KOP [1945]:60). If Parsons had not already installed sewer and water systems prior to the coming of the plant, so many people moving to and passing through the area could have caused much greater health problems than they did. The risk of infectious diseases becoming epidemic, often a possibility when large numbers of people are living in crowded conditions, was reduced by the establishment of the county health unit, which began inspecting restaurants and trailer parks for health violations early in the construction era. One of that agency's first actions was to immunize children against diphtheria and smallpox during a campaign in mid-March 1942. But this was not prompted by the population increase; a state campaign to eradicate these diseases had been underway for five years (PS 1942i). The only health problems of large proportion seem to have been a chicken pox "epidemic" in October 1942 (PS 1942q) and an influenza "epidemic" of December 1943, when JMS had "a difficult task trying to keep employees physically fit and on their feet so that production schedules could be met" (KOP [1944]b:218). Garbage collection, another health threat, was first discussed in early 1942 (PS 1942a). A collection system began operating at the end of April to haul off the "huge accumulation of trash" then in the city (PS 1942k).

As during construction, gambling and the illegal sale of liquor were problems in Labette County during operations. But there were only a few reports in the newspapers dealing with these subjects, such as the article concerning a man stabbed at the plant because of an argument during a dice game (PS 1942l). Local residents' recollections regarding crime in general during the period were mixed. Cooper (interview 1995) felt crime did not increase after construction began, but his wife thought it did, adding that there was a lot of prostitution in town. Only two instances related to prostitution were noted in the newspapers of the period, both in January 1943, when vice investigations revealed 15 teenage women between the ages of 15 and 18 were involved in prostitution. This was more related to the transportation of troops through the area by train than to the population increase or the construction of KOP. "Chief [of Police] Bolander said his investigation to date shows that a 'shocking' condition exists here and in numerous other towns in this vicinity where soldiers congregate" (PS 1943a). The women, all from out of town (PS 1943b), were "not professional prostitutes, Bolander said, but just 'kids' who have cut the home ties and are 'running wild'" (PS 1943a). It is not known whether this was an ongoing problem for Parsons, but Mabel Barker, a resident of Oswego prior to World War II, mentioned that Parsons had long been a "den of iniquity" (personal

communication 1995), and a 1950s magazine article about the “pleasure town on the prairie” mentioned Parsons had numerous gambling parlors and prostitutes, and that there was “a good supply of bennies and barbiturates” in the local taverns (Townsend ca. 1953:65-67).

The Shortage of Labor at KOP

The shortage of labor, especially skilled labor, was a problem from the very beginning of industrial mobilization (Kane 1994:250; Thomson and Mayo 1991:37). Approximately half the construction force for KOP had little previous experience in the building trade (Oxford, interview 1995; Voight 1945:161). And when operations began in the 900 Area in July 1942, 98 percent of the available labor pool “had no industrial training background” (KOP [1945]:206). The shortage of labor also affected businesses and farms in the area. Wages for jobs not related to either the construction or operation of KOP rose due to the competition for limited labor (Cooper, interview 1995). “Some [Farm Security Administration supervisors] in Kansas express the opinion that 75¢ to \$1.50 per hour is very attractive to persons accustomed to a dollar a day, and even that available only when they could find occasional jobs. Four Kansas supervisors report fairly large numbers of farmers leaving agriculture for defense industries, and these four supervisors all have defense industries located in their own or adjoining counties” (Ward 1941:28).

In the spring of 1942, the Industrial Relations Department of JMS began a Rural Recruitment Program. Recruiters visited towns within about 40 miles of the plant and conducted interviews with interested local residents during the afternoons and evenings (KOP [1942]:117-118). Many of those they hired were women, and as early as September 1942, a quarter of the work force at KOP was female (PS 1942p). This percentage would rise dramatically toward the end of the war.

Near the end of 1943, the Bomb Load and 155-mm Shell Load lines were closed for modifications, which should have substantially reduced the labor needs at KOP. In December 1943, recruiting activities were halted, perhaps for the first time during operations. Recruiting efforts began again in the first months of 1944 “due to competition from other businesses,” but these were not successful (KOP [1944]b:216). It was during this time that the labor shortage nationwide was becoming critical. Facilities placed on stand-by during 1943 were being brought back into production, and the draft was taking an increasing number of workers into the armed services (Fairchild and Grossman 1959:47, 52; Kane 1994:251). Although JMS began advertising on radio and in the newspaper again in March 1944, a “credit system of offering food and shelter to needy applicants” was discontinued, and the managers felt this hurt the recruiting effort (KOP [1944]b:216). Another difficulty was the length of time it took the Investigation Department to approve new hires. During the two weeks it took to authorize applicants²⁰, some would locate other jobs. This caused enough of a problem that JMS began putting applicants to work in nonrestricted and semirestricted areas as soon as possible (KOP [1944]a:75). Competition from outside employers, and optimistic reports in the local newspapers that the war was almost over, may also explain part of the rise in turnover in 1944 (KOP [1944]a:2).

During the first quarter of 1944, “the proportion of women employees was constantly increasing,” as was the average age of workers at the facility (KOP [1944]a:3). Thus, during the next quarter, likely as a result of the draft, JMS began hiring 16- and 17-year-old males to work in the Inert Storage and Administration areas, “providing their weight was at least 135 pounds” (KOP [1944]c:21; KOP [1945]:60). In the summer, a 100-passenger bus (possibly one of those originally acquired to take dormitory residents to their work

²⁰ This lengthy investigation probably only applied to production employees. Josephine Habiger (interview 1995) recalled that when she applied for a secretarial position in administration, she was notified that she had the job within two hours of taking a typing test and began work the following day. She started her employment at the plant in the winter or spring of 1944.

stations) was converted into a mobile employment office. Recruiters took this office to most of the communities of southeast Kansas. An intensive publicity campaign that August in Chanute, Kansas, attracted about 125 applicants and was considered enough of a success that similar campaigns were planned for other areas (KOP [1944]d:2-3). A recruitment contest was held in September 1944, with war bonds given as prizes—\$50 to the person who recommended the most applicants plantwide, \$25 for the same in each department, and \$5.00 bonuses were given to all those who recommended a new employee if that employee stayed on the job without an unexcused absence for 30 days. A second \$5.00 bonus was awarded after 60 days. As a result of this contest alone, 470 people were hired at the facility (KOP [1944]d:4-5). An effort was also made to hire part-time employees, geared toward businessmen in the area. In March 1944 there were 50 part-time workers at the plant (PS 1944a). By May, the figure had only increased to 73 and JMS was appealing for more part-time and seasonal help, like teachers willing to work during the summer months (PS 1944b).

During 1944, the recruitment area was further expanded to cover a radius of about 150 miles from the plant.

Many of the new employees came from the Southwestern Part [sic] of Missouri or the Northeastern Part [sic] of Oklahoma. Some of the activities of the plant [such] as the shipping of inert materials were seriously hampered by the scarcity of the labor. No apparent solution had been found for the situation. The plan of the business men coming out to the plant for four hours of work per evening did not prove to entirely solve the situation. In fact towards the close of the period very few laborers of this type were left. The substitution of women laborers for men laborers proved to be the best solution. However, in the shipping department the women were not able to successfully handle 50 pound or over packages. Therefore attempts were being made to get vendors to change to a lighter and smaller package. Some of the vendors complied with the request (KOP [1944]a:2-3).

At the end of the year and during the first months of 1945, nearly 200 soldiers were given temporary furlough from Camp Crowder, Missouri, so that they could work in the Transportation and Stores Department (KOP [1945]:56, 58, 61). Although the period from early 1944 to mid-1945 was a difficult time for KOP in terms of the labor shortage, “recruitment contests conducted in the plant, a Citizens’ Emergency Manpower Committee, and intensive recruitment program in Kansas, Oklahoma, and Missouri produced sufficient workers to meet successfully production schedules” (KOP [1945]:61).

Women in the Work Force

Nationwide, approximately seven million people, male and female, were involved in the production of war-related goods by the end of 1941. More than twice that number were needed. During 1941 and much of 1942, little had been done to target potential female employees at munitions production facilities, but this was beginning to change as KOP went into full operation in mid-1942. Women constituted at that time a pool of 36 million potential employees, none of whom were being drafted. This stood to be of great benefit to the war production industry, and hiring practices eventually took that fact into consideration (Fairchild and Grossman 1959:169).

As noted above, a significant percentage of the employees at KOP were female even during early operations. Overall, 23 percent of the work force was female in September 1942; in production work, 36 percent were female (PS 1942p). The first women were placed in supervisory positions in 1942 on the Detonator Load Line, where the majority of the workers were even then women (KOP [1942]:40). In the first week of 1943, a large-scale program was begun through which men who had been called into the service were replaced with women (KOP [1943]a:1). This effort was not only a replacement of one laborer with another, but was also a conscious effort on the part of JMS management to further integrate women into the management of the facility.

In the Employment Division, women were being extensively used on many jobs before January 1, but after that date it became the policy wherever possible to replace men, who left the plant, with women rather than to attempt to find male replacements. Women were used on many jobs on which it had been previously thought impossible to use them and for the first time were introduced into the machine shop. In view of this situation, women interviewers were added to the Employment Staff whenever replacements were necessary, since it was felt that they might be able to deal more effectively with many of the problems upon which the successful introduction of women was contingent. Moreover, women personnel clerks were assigned to a number of personnel assistants, partially in order that the personnel assistant might be relieved of certain detailed work and be able to do a more effective job, but primarily in order that the women might be familiarized with personnel problems and procedures and be able more effectively to deal with personnel problems as personnel assistants were withdrawn [sic] for service in the armed forces (KOP [1943]a:36).

The opportunity to learn more about supervising and management was welcomed by the female employees. At the foremen's meetings (see the section of this report discussing Training and Education), there was a fairly high rate of absenteeism among the lower level supervisors in general. However, female supervisors attended regularly and actively took part in discussions. JMS managers felt these women realized the meetings were good opportunities to gain training and experience, and thus, took greater advantage of what was offered to them than did their male counterparts (KOP [1945]:74).

One problem JMS had with hiring women was absenteeism, a national problem that in many cases may have been "attributed to the strain of working full time and simultaneously meeting traditional obligations" (Kane 1994:285). JMS recommended that, "if possible, [the Personnel Department should] hire only those who are self-supporting. Married women with very young children constitute an absentee problem" (KOP [1943]a:95). To help reduce the problem, a day nursery was considered, and JMS managers thought they could even receive partial funding from the government (KOP [1943]a:96), but it was never offered at the facility (Morrow, personal communication 1995; Oxford, interview 1995). No matter the problems, though, there seem to have been many mothers working at the facility (Larsen, interview 1995; Morrow, personal communication 1995; Oxford, interview 1995).

As the labor shortage became more acute in 1944, women were more often placed in supervisory positions. Although JMS originally planned to use only males as inspectors (KOP [1945]:149), female inspectors were replacing men during the first quarter of 1944, and perhaps earlier. "The number of arsenal trained men who now occupy supervisory positions in the inspection department is gradually decreasing and in the not too distant future it will be necessary to replace many of these technically trained men with women" (KOP [1944]b:161). And an effort was begun to use women for some positions requiring heavier physical labor. In the Transportation and Stores Department

an attempt was made to replace Male Handlers on certain lighter jobs with Female Handlers. This proved unsatisfactory due to the fact that it was impossible to get women who were able to do the heavy type work required over an 8 hour period. However, we were successful in replacing men at the Inert Warehouses on each Production Line with Female Warehousmen [sic] and Fork Truck Operators. They have not proven as efficient as men but it is felt that with practice and experience their efficiency and speed will increase (KOP [1944]b:226).

On some production lines, this problem could be solved by using machines to do the heavy work and increasing the level of automation on the lines, a combined effort of the Production, Service and Engineering departments (KOP [1944]a:39; KOP [1945]:25). In the 900 Area, one supervisor noted that "women could do all work on the production lines with the exception of heavy lifting or movements of heavy loaded trailers," so they added equipment to do the heavy work (KOP [1945]:188). By contrast, in the 1000 Area during the third quarter of 1944, "it was necessary to remove all women operators from the fuze 'tensioning' operation and replace them with men" because it was "very difficult to seat the fuze" (KOP [1945]:215).

A different strategy was used to solve a problem in the Assembly, Packing, and Shipping Building, where women were given nail hatchets, perhaps lighter than the hammers. With the change, "female personnel performed equally with male operators. Due to lack of manpower female nailers were used 100%" (KOP [1944]c:11).

Another problem involved a change in the design of the plant, originally intended for primarily male use.

Considerable trouble had been experienced in operators going to the clock early because of the distance the women in the melt load section had to go to their respective change house. Plans were made for the dividing of the 1015 change house (men's) so that both men and women could use this change house. When the change was made it proved very satisfactory—lessened the congestion in the women's change house and was easier to hold the women in the melt load section at [the] time of the shift change (KOP [1945]:251-252).

The increasing number of women working at the plant also required the hiring of more female guards, called Guard Matrons (KOP [1945]:124). In the spring of 1942, 232 guards were male and 23 were female (KOP [1945]:125), about nine percent of the total. By the end of the war there were 134 male and 41 female guards (KOP [1945]:126), almost 25 percent of the total.

The women working in production were noted to have been, in general, "of a higher type than the available male employees" (KOP [1945]:206; see also KOP [1945]:188). As noted above, there were some duties women did not usually perform as well as men, primarily lifting heavy loads. In other duties, such as the assembly of small parts, they performed better (KOP [1942]:34). However, when the notice to cease operations was received at the plant, the women were the first to be released from service. In the 1000 Area, all women were laid off, the men retained for packing the last shells and cleaning the line (KOP [1945]:262). In the 1100 Area, 17 August was the last work day for the female operators; the men were consolidated into a single day-shift thereafter (KOP [1945]:289-290).

African-Americans in the Work Force

Although production pressures and the labor shortage increased employment opportunities for African-Americans at some facilities (Gaither 1994:141), these do not seem to have had an enormous impact at KOP. At the national level, overtures meant to foster the hiring of more blacks were heard as early as the second half of 1941. The Army position on racial integration had been that if it would in any way slow production, the hiring of blacks should be avoided—"wait until after V-E Day to reform the world" (words of a high-ranking Army Service Forces officer as quoted in Fairchild and Grossman 1959:173). President Roosevelt felt this stance needed modification, and on 25 July 1941 acted on the recommendations of the LaGuardia committee²¹ and issued an executive order meant to end discrimination against war industry workers on the basis of race, creed, color, or national origin. The president reemphasized the order in September by sending out press releases urging "all Government departments and agencies to take immediate steps toward eliminating discrimination, particularly against Negroes, in the Federal civil service" (IOW [1942]:newspaper clipping attached to September 6, 1941, entry). Local implementation was another matter.

Parsons had a relatively high black population at the beginning of the war (Gerdes, interview 1995; Habiger, interview 1995; Larsen, interview 1995; Oxford, interview 1995), possibly due to employment opportunities with the MK&T railroad (Habiger, interview 1995). Black and white populations were segregated, living

²¹ The committee, headed by New York mayor Fiorello H. LaGuardia, was formed in response to the grievances of a number of African-American rights groups. The committee proposed "forbidding discrimination in war industry and requiring government contracts to bear a nondiscrimination clause" (Fairchild and Grossman 1959:158).

in separate areas (Larsen, interview 1995), and secondary school diplomas were handed out to groups segregated by race during the 1940 graduation ceremony, although the NAACP and Colored Young Republicans Club were asking that this practice be abolished for the 1941 graduation (BOE [1951]:141). In illustrating segregation in Parsons, Harold Cooper (interview 1995) related that eight to 12 employees of a publishing company who regularly ate at his restaurant avoided it after a black man was fed in the front room rather than in the kitchen where “porters and people that worked in barber shops and places like that could go back there and eat. . . . The next day, we didn’t have anybody from Commercial Publishers. . . . [It was all over town that] ‘They’d fed a nigger at the Cooper’s Cafe.’ . . . That’s what they called him, a ‘nigger.’ And, so we had a kind of hard time living that down. I don’t know as we ever did.”

Segregation was extended to operations at the plant as well, and there are indications that this was either the source of or reason for racial tension. There was a separate hospital ward for blacks (KOP [1942]:115), and two dormitories were set aside for use by blacks, but only after two months of low occupancy by whites (KOP [1945]:55). Segregation may have been a mutual desire, since “the colored residents [of the dormitories] have repeatedly insisted upon our providing separate recreational space and facilities for them,” (KOP [1945]:55), but it may have been that they were not allowed to use recreational areas whites were using and were requesting the “separate but equal” facilities they were entitled to under *Plessy vs. Ferguson*, then the legal scale for determining discrimination (Kane 1994:262).

Segregation in employment was evident as well. The change house cleaners were described as the “colored maids in the change houses” (KOP [1945]:51), and Larsen (interview 1995) noted that blacks worked as janitors, maids, and in the cafeteria. There were some black operators working on the lines, but it is not known how many as the only reference to the subject simply mentions that “during September [1943] . . . three colored matrons were employed [by the guard force] to handle colored line employees” (KOP [1944]b:137). As the labor shortage worsened, JMS probably considered hiring more blacks since in the last quarter of 1943 the “security plan in connection with racial disturbances” was reviewed. Also during this period, “investigations [were] made of pro-Japanese statements made in the lines by certain colored employees” (KOP [1943]d:8). The final plant history for the World War II operations era recorded that “aside from avoiding any material damage, many other difficulties have been ironed out by the Guard Department—an important one has been that of racial difficulties.” It went on to say that “no serious trouble has arisen in any of the Change Houses, which could easily be the focal points for any racial conflicts” (KOP [1945]:137).

Historian K.L. Kane (1994:268) has noted that further study into race relations at individual GOCO facilities is needed, and an attempt was made to investigate how the KOP’s existence influenced racial relations in Parsons and Labette County. Unfortunately, the only African-American ex-employee of the facility located during research declined to be interviewed, and the historical records at the facility and at the archival locations where research was conducted held little information on this aspect of World War II-era operations.

Other Ethnic Minorities in the Work Force

The lack of information in the historical record regarding African-Americans who worked at the facility during World War II-era operations is matched by the lack of information about other ethnic minorities. One immigrant, however, was specifically mentioned. Jules “Frenchy” Cheval, who came to the United States from Pas de Calaise, France, in 1911, worked at the burning grounds. He had served with U.S. forces in World War I, and his son was a sergeant in the Army in 1943 (*VOX KOP* 1943).

Although ethnic minorities were otherwise not mentioned specifically, a precaution taken when they were hired was discussed in the historical record. Whether they worked for JMS or the Ordnance Department, the KOP Intelligence Department forwarded fingerprints of all employees “who had [a] foreign background or were of foreign extraction” to the FBI (KOP [1944]d:40). There also may have been a high Hispanic

population in Parsons at the time (Larsen, interview 1995), but there was no mention in the historic record of Hispanics working at KOP. And at least a few Native Americans worked at KOP. The only enumeration of this group comes from March 1944, when seven males and 12 females were employed, most in production (War Department ca. 1942:n.p.).

JMS also considered hiring foreign laborers, as was done to alleviate labor shortages at Kankakee Ordnance Works (now part of Joliet Army Ammunition Plant), Nebraska Ordnance Plant (no longer a part of the AMC inventory), and Cornhusker Ordnance Plant (now Cornhusker Army Ammunition Plant), where laborers from Barbados and Jamaica were employed (Voight 1945:85, 158, 231). In early September 1944, "application was made for 100 Barbadians to work at this plant in accordance with an agreement between the United States Government and the Government of British Honduras" (KOP [1944]d:5). However, recruitment efforts then underway proved successful enough that the application was withdrawn (KOP [1944]d:5). Thus it appears that no foreign labor was imported for the operation of the facility.

Everyday Life at the Plant

KOP was the largest enterprise most people in Labette County had ever seen. "It was like a city, about like the city of Parsons. . . [We had] about 10 or 12,000 [people out there]" (Gerdes, interview 1995). Typical life in this industrial city was busy, sometimes pressured, regimented by the time clock (a new concept for the large number of farmers working at the facility), and an opportunity for individuals not part of the traditional labor pool to gain experience in areas that would have most likely remained closed to them, for at least a few more years, had industrial mobilization not helped open these doors.

Absenteeism and Turnover

Few specifics related to absenteeism and turnover for the facility as a whole were located while conducting research for this project. One area where there was some discussion was in the Guard Department, where turnover was noted to have been particularly high during the last four months of 1941. The reasons were numerous and included enlistment, the high cost of living, and the results of character investigations and physical and mental examinations (KOP [1945]:123). Personnel losses in the department averaged 20 to 35 per month, the highest turnover being in October, when 62 guards quit or were terminated. Difficulties finding replacements caused the department to relax hiring restrictions, lowering rigid qualifications concerning age, weight, and height (KOP [1942]:76).

In contrast, turnover among cafeteria staff was low. Pay was comparable to local standards, but below that of production work (KOP [1945]:48), where absenteeism and turnover were higher. There is an indication that the cafeteria staff was mostly composed of African-Americans (Larsen, interview 1995). KOP may have been one of the few employers at that time offering members of this population steady employment at even an average wage. Fewer job opportunities may have meant lower turnover among African-Americans.

In the first quarter of 1943, JMS realized that issuing paychecks on Saturday was a cause of high absenteeism. Since employees could not cash their checks Saturday night, they would "stay home Monday to shop and pay bills" (KOP [1943]a:95), so the day checks were issued was changed (KOP [1943]a:96). Causes of absenteeism as specific as this and with a definite solution were probably rare. Higher rates of absenteeism during the third quarter of 1943 were, without further explanation, attributed to "fortune tellers" (KOP [1943]c:18). JMS managers tried to increase attendance by appealing to employees' sense of competition and pride. A club called the KOP Regulars was established, membership requiring an employee to have at least six months of service with no unexcused absences. Badges were awarded for each ensuing period of continual six-month attendance (KOP [1945]:74-75). The club was effective in some cases, as can be seen from a report entitled "K.O.P. Regulars" in the last World War II-era plant history. One woman,

because she "was so proud of her record" KOP [1945]:94), hired a taxi to take her to work one morning when her ride failed to show up. The cab fare was more than a full day's pay. "Many employees were forced to detour up to twenty miles because of high water, but preferred to do this, rather than stay off the job even for one day" (KOP [1945]:94). By August 1945, JMS Operating Manager C.B. Burnett had been on the job continuously for four years. By the end of the war, 193 employees had earned three-and-one-half-year awards, 1,002 had earned three-year awards, 1,369 had received two-and-one-half-year-awards, and 1,937 were given two-year awards (KOP [1945]:95).

Local newspapers may have contributed to increasing rates of absenteeism by printing optimistic reports about a quick end to the war, which began appearing as early as the spring of 1944 in the *Parsons Sun* and the *Oswego Democrat*. A supervisor for the 1000 Area observed that after V-E Day "it became very hard to get the maximum amount of work from the operators. Those operators that had sons, husbands, or sweethearts in the service fighting in Europe seemingly had the idea that their part of the war was over when this end came" (KOP [1945]:256). Vendors seemed to have been experiencing similar problems, exacerbated by "considerable newspaper talk of a near end of the Japanese war." Because of this "their materials were not up to the standard of the past. Fiber containers, liners and fuze[s] and boosters were continually giving trouble by not meeting specifications as set forth by Ordnance" (KOP [1945]:258).

Safety and Security

No breeches in security, major or minor, were reported in the KOP histories covering World War II operations. JMS had rigid standards for hiring guards. Between 4 September and 29 November 1941, 1,173 applicants for guard positions were interviewed. "Only 301 passed the necessary mental examinations, of this 301 applicants a number of them were turned down later due to physical reasons and character investigations" (KOP [1945]:120-121). Character investigations were conducted on all employees once a year, but guards were investigated at least once every six months (KOP [1942]:84), and they rotated shifts (KOP [1942]:76) to reduce the likelihood of establishing relationships and routines that might be useful to someone wishing to sabotage the facility. Each guard car on the plant was equipped with a 12-gauge shotgun, a Winchester Model 94 carbine, a Rising semiautomatic 45-caliber rifle, tear gas grenades, and "3 way and carbine sickening gas" (KOP [1942]:75).

Similar hiring precautions were extended to other employees, especially employees in the production lines. The preemployment physical examination by the JMS Medical Department included "a chest x-ray, blood plasma sent to State laboratory for Wasserman[n] test [for syphilis], hemoglobin test, urinalysis, eye test, blood pressure, and a history of serious illnesses for the past five years" (KOP [1942]:115-116). Based on the findings of the Medical Department, all employees were placed into one of four classes:

Class I - Work anywhere (no physical restrictions)

Class II - Same as Class I, except less than 20 years old.

Class III - Physically limited other than age.

Class IV - Physically undesirable, but still of passing grade. (It [sic] was requested that all employees whose serum gave a positive seriological reaction for syphilis be put in Class IV) (KOP [1944]b:149).

During the last half of 1942, about 3.33 percent of the applicants were rejected. This increased to 5.8 percent during the first six months of 1943. The increase in rejections was attributed to an increase in "the number of undesirable applicants seeking employment at war plants" (KOP [1944]b:142), which was in turn perceived to have been caused by the labor shortage. The qualities deemed undesirable during this time were not physical in nature, nor were they "based upon an indication of disloyalty" to the war cause. Instead, many applicants were turned away because of psychological problems—"numerous cases were found where the applicant had been previously hospitalized to an insane asylum, or had been subject to epileptic seizures" (KOP [1944]b:142). Moral conduct was also taken into consideration in the character evaluations conducted

by the Investigation Division. In the spring of 1944, the labor shortage caused a relaxing of the moral standards required to work at KOP—"It is believed that there are some persons whose moral reputation is such that they would not be considered for employemnt [sic] in normal times but that would not necessarily be harmful to the Plant. However since there is an ever increasing proportion of applicants whose characters do not seem to measure up to the desired standard, it has become necessary for the plant investigator to make a large number of special investigations of persons who appear to have questionable reputations" (KOP [1944]b:214).

Fear of sabotage and accidental explosions were evident at the national level as well as the local. In March or April 1942, JMS received a letter from the Ordnance Department which "had a profound influence on the melt loading lines" (KOP [1942]:26). The instructions in the letter, believed by JMS managers to have been an effort to correct "any general practices that may have existed at loading plants at about the time of the disastrous explosion a few weeks earlier at the Iowa Ordnance Plant" (KOP [1942]:26)²², stated that no changes were to be made to melt load equipment without written approval from the Ammunition Division of the Office of the Chief of Ordnance, and set out strict guidelines governing the movement of all plant personnel and nonemployees into and through the loading areas. Thereafter, continuous investigations of all employees working in the 1100 Area would be conducted (KOP [1942]:26). The practice did not last long, however. JMS asked the St. Louis FDAP for a clarification of the instructions in the spring of 1943. The FDAP replied that it would "no longer be necessary to make reinvestigations of employees except when the results of the first investigation indicate the desirability of such action." Up until April 1, 1943 complete or partial reinvestigations of a little less than one thousand employees had been conducted" (KOP [1943]a:20).

Local fears of explosions were reflected or exacerbated, perhaps both, by the numerous reports of explosions at other facilities carried by the local newspapers. Josephine Habiger (interview 1995) related that there was at the time concern about an explosion at the facility. To lower the possibility of such an occurrence, items such as matches, smoking materials, caustics, and abrasives (which could have caused hazardous chemical reactions?) were prohibited from production areas (KOP [1944]d:56-58). Matches found in smokeless powder in the 900 Area during the last quarter of 1943 prompted an investigation at the plant (KOP [1943]d:8). For this and other reasons not stated, JMS management felt that personnel at the plant were becoming lax in their handling of explosives, so "pictures were shown of other plants that had experienced 'blows'" (KOP [1943]d:9).

Health problems due to working with highly toxic explosives were a daily matter of personal safety worrying both line operators and management. Maxine Larsen (interview 1995) said that her mother "worked in powder. And her hair turned yellow, and her fingernails. . . . A lot of people couldn't take what they called the powder." Her mother, who continued to work at the plant until the end of the war, did live to be 81, and Larsen did not think exposure to the toxins caused long-term ill effects in her mother's case. Attention to worker safety at KOP began with the design of the facility, and the engineering departments for both JMS and the Ordnance Department checked all designs to make certain they conformed to safety recommendations from Picatinny Arsenal, the Chief of Ordnance, and personnel at other GOCO facilities (KOP [1942]:66), but numerous health problems among the workers indicated this was not sufficient.

Large-scale examinations of the workers for TNT poisoning do not seem to have begun until early 1943, perhaps because few problems had surfaced prior to that time. In January, employees on all three bomb and shell load lines were shown how to wash more thoroughly and examined to see if TNT remained on their skin after showering at the end of their shifts. "The early checks showed 20% to 30% of the employees still had T.N.T. on their bodies. After a series of rechecks this was brought down to 2% to 4%" (KOP [1943]a:34). To help employees remove all traces of TNT, they were provided with a special soap, manufactured at KOP,

²² That explosion occurred in March, killing 22 persons. It was the second major explosion at that facility, following close behind the December 1941 explosion in which 13 persons were killed (Kane 1994:289).

which changed color when it came into contact with the explosive. When all TNT was removed from the skin, the lather would remain white (KOP [1945]:103). It was also necessary to remove TNT from workers' clothing, and JMS enlisted a consultant chemist who "devised a method by which we have since been able to remove all traces of TNT" (KOP [1945]:98)²³. Nevertheless, 25 workers suffered from anemia, 17 from digestive disorders, eight from neurological disorders, and six from "R.B.C." (low red blood cell count?) attributed to TNT poisoning during the first quarter of 1943. The precise operations conducted by these operators is not certain, but the "location" of 25 was given as "melt load." Six others worked in "tail pour," five each in "paint" and "scrap," and four each in "screen" and "melt pour" (KOP [1943]a:34-35). Between October 1942 and October 1943, 3,261 employees were "treated for a lowering of hemoglobin due to toxic reaction" to TNT (KOP [1944]b:220).

"Folger system" checkups were routinely given to all workers who came into contact with TNT to identify dangerous levels of exposure, and "early in 1943 . . . the KN. O.P. [sic] Medical Division developed its own [method of] blood analysis to determine whether or not an employee working in TNT was becoming affected with a toxic poisoning" (KOP [1945]:102). Physical examinations were also conducted regularly in the production areas. Testing carts were taken to the lines, where up to 1,500 examinations were given each month. Thus JMS was able to keep accurate figures regarding the number of employees coming into contact with toxic levels of TNT. "The normal number of employees affected in this type of Plant was set up by experience from World War I together with experience of powder plants, and this normal was set at 9%. In the early days of [operations at] the Plant in the summer months, the percentage of employees affected ran as high as 17½ %. As the Plant progressed more dust and fume controls were installed and with the new type of periodic [examinations?] the Plant has run at less than 4% on affected employees" (KOP [1945]:102)²⁴.

There were two other major health problems during operations, which may not have been related to TNT poisoning. In early May 1944, there occurred an "epidemic of coryza and conjunctivitis . . . [among workers] from certain buildings with no apparent reason" (KOP [1944]c:21). The cause was eventually traced to the use of a new dye, called sodium-penta-dchlorophenate, used to mark ammunition boxes. Employees were issued respirators, and the composition of the dye was changed (KOP [1944]c:21-22). The other problem was still a mystery at the close of World War II-era operations. On one line not clearly identified, probably the 300 Area, "a peculiar type of dermatitis due to what we believe [to have been] a tropical fungus was diagnosed. This problem was not solved, but we do feel that we have made some headway in its treatment. All applicants had chest x-rays and over 40,000 x-rays were taken" (KOP [1945]:105).

Training and Education

Given the high ratio of workers at the plant who had never had any experience in industrial production nor had ever worked for anyone other than themselves—the large number of workers "gathered from the four

²³ It is not clear at what point during operations this took place, but it was likely some time in 1943.

²⁴ The dust control measures mentioned here most likely refer to dust collector systems installed first in Building 1017, the TNT Screening Building for the 1000 Area, during the third quarter of 1943 "for the purpose of removing explosive and toxic dust and vapors. . . . The dust counts and observations made revealed that the dust and vapors were being satisfactorily removed, but economically it was questionable as to whether it should be installed in all locations where the dust and vapors were present" (KOP [1943]c:6). These "dust control units which utilized wet collectors and which were designed and tried at this plant have been approved as standard equipment for screening buildings" (KOP [1943]d:9).

corners and from all walks of life" (KOP [1945]:68)—training was essential, to say the least. And JMS' Production Planning Department took great pains to provide adequate training. Information about every step of production, garnered from Picatinny Arsenal standard practice books, drawings of buildings and equipment, and discussions with other munitions facilities operators, was gathered together by Planning Department personnel, and for each item of production at KOP, "a complete standard practice was written together with actual tool and personnel requirements" (KOP [1942]:21-22). These were then used to train supervisors and inspectors in a one-week course (the first one beginning 26 December 1941) which gave "an introduction to ammunition loading, with particular reference to safety, quality and actual operations" (KOP [1942]:22). The supervisors were then sent to facilities already in operation for periods of two to six weeks, and what they learned in the field was incorporated in the procedures and line layouts at KOP. If there was enough time and additional field training would be of benefit, the supervisors were again sent to observe at other facilities (KOP [1942]:22). By the end of construction, 424 supervisors and technical personnel had undergone training (KOP [1942]:2 of attachment to p.7).

Further training for supervisors was offered in a series of Foremen's Meetings, as they were called, which began 14 December 1942 (KOP [1945]:68, 71). The management of JMS felt that "there was real ability and potential value that could be tapped if we could get these men together and discuss general problems and procedures common to all. We would be able to get the best thoughts of all and pool them for the benefit of the group. It was not intended as a class of instruction because it was felt most people have an aversion to class work after they have completed their formal education" (KOP [1945]:68). The meetings were planned as informal gatherings, attendance voluntary, where a variety of topics would be discussed for periods of two weeks each, giving all interested persons adequate opportunity to attend (KOP [1943]a:30).

By the end of March 1943, seven topics had been discussed, including absenteeism, grievances, and supervisor responsibilities under the National Labor Relations Act (KOP [1943]a:30). The feeling at the time was that the meetings were greatly beneficial, resulting in "some very good suggestions that have been accepted by Management, . . . securing tangible results" (KOP [1943]a:30), so they were continued until at least the summer of 1943 (KOP [1945]:82); by the fall they seem to have been replaced by the more formal Foremen's Institute, which dealt more with functions and procedures involved in operations (KOP [1945]:83). In hindsight, however, management questioned the value of the informal Foremen's Meetings.

In reviewing the attendance records of our conferences we noted that the attendance of the higher levels of supervision was excellent. . . . [But] in our lower levels of supervision there was much absenteeism. They were the ones who were always too busy or did not remember to come. In this group were foremen and working leaders who had had no previous supervisory experience or training. It was this strata of supervisors we felt we could do the most good for through discussing the mutual problems of the foremen. . . . Our female supervisory personnel constituted interesting conferees due to the fact [that] as a whole they attended regularly and took an active part in our discussions. It seems as though they realized their deficiency in previous training and experience, therefore, took hold of this opportunity to learn more about their present jobs (KOP [1945]:73-74).

Additional formal education was also offered employees. Training courses in engineering, science, management, and other areas were provided by the U.S. Office of Education and the University of Kansas "to provide opportunity for individuals to further their qualifications and at the same time prepare for rendering a still greater service in the all-out war effort" (VOX KOP 1942c:5). The classes were free of charge. Night classes in vocational studies, sponsored by the federal government, were also held at the West Junior High School in Parsons (VOX KOP 1942d).

Efficiency

In general, KOP was an efficient producer of material during World War II. As discussed in the preceding section of this report dealing with operations, many technological innovations increased the amount of material produced while decreasing the number of operators required on the lines. The movement toward greater efficiency described by a supervisor of the 300 Area was probably indicative of the approach JMS management in general took toward the subject.

Since three million M-48 Fuze have been produced prior to January 1, 1943, it was obvious that the personnel of this line had become reasonable [sic] efficient, it was now time to concentrate on the reduction of production costs. By the use of time studies and by rearrangement of some of the operations the operating force was reduced from 270 to 220. During this period the man hour costs per hundred unit fuzes was reduced from 18 to 16.78 with the goal of 13 man hours per hundred unit (KOP [1943]a:60).

Some improvements in production methods and equipment were of national significance, such as the core melt equipment developed at KOP, discussed in the section of this report concerning World War II technology. This development impacted all LAP facilities in the United States. Other developments, like the use of a wax that worked with new automatic equipment better than the type of wax recommended by Picatinny Arsenal (KOP [1944]a:55), were far less important. Yet in concert, such small improvements in the manufacturing and assembly processes greatly enhanced production.

In recognition of its efficiency in production, the Ordnance Department five times awarded KOP with the Army-Navy "E" award for excellence. KOP was presented with its first "E" award on 9 October 1942 (Voight 1945:162), which consisted of a flag and a lapel pin for each employee. Considerations for the award (as stated in *VOX KOP*, the plant newsletter) included the efficient use of equipment; steady production; the application of fair labor standards; infrequent health, safety, and security infractions; and effective training of the available labor force (1942g:2).

The "E" award was presented to KOP on 24 November 1942²⁵, and KOP was the first bomb and shell loading GOCO facility to be so honored (KOP ca. 1985:1). Both the president of Johns-Manville Corporation, Lewis H. Brown, and Governor Payne H. Ratner attended the presentation ceremonies, paying tribute to the people of Kansas and applauding the goals of industrial mobilization (*VOX KOP* 1942h:1-2). Four subsequent Army-Navy "E" awards were presented on 28 August 1943, 11 March 1944, 16 September 1944, and 17 March 1945 (KOP ca. 1985:1).

THE END OF THE WAR AND HINDSIGHT—THE WIDER IMPACT OF THE FACILITY

The construction, operations, and closure of many GOCO industrial facilities profoundly impacted surrounding areas. The impact KOP had on Parsons and Labette County, however, was much less severe than it would have been had there not already been a fair amount of industry in the area.

Economic and Social Effects on the County and State

With the sudden release of thousands of employees, the end of the war substantially increased unemployment in some areas with GOCO industrial facilities. Robert Oxford (interview 1995) believed the closing of KOP

²⁵ A different plant history says the "E" flag was "awarded" on 31 October 1942, which may be a discrepancy in the dates but more likely was the day the award was announced.

had little negative impact on Parsons since a very small percentage of the employees then working at the plant lived in Parsons. With a work force distributed over a wide region, it is doubtful the plant's closing had a heavy impact on any one locality. Oxford also noted that more small businesses were opening in the area at the time. And the MK&T railroad was hiring men released from the plant as rail traffic increased near the end of the war.

The Katy railroad, long the principal employer here, is badly in need of workmen, particularly firemen, brakemen and laborers. Several men who have terminated recently at the KOP have found immediate employment with the railroad (*PS* 1945b).

That was in June 1945, and the railroad's need for employees was not expected to abate anytime soon. Instead of an oversupply of labor at the end of the war, the railroad expected a labor shortage as high as 10,000 (*PS* 1945b).

The word to shut down operations at the plant was received 14 August 1945 at about 6 P.M. (KOP [1945]:262). The last 4.2-inch shell was poured in the 1100 Area that day (KOP [1945]:289); most shells in the process of production were completed on 17 August, and all were completed by the twenty-fourth. The majority of the workers were terminated by 22 August (KOP [1945]:207, 262, 289, 291). The United States Employment Service (USES) office in Parsons was swamped (*PS* 1945c), the majority of the applicants for unemployment benefits being women. The USES received numerous calls from local industries that needed workers, either male or female (*PS* 1945d).

Although the mood in the newspapers at the time was positive about employment opportunities in the area, later investigations show that attitude to have been overly optimistic. In a Vietnam-era report investigating the impact the plant had on the region, the authors stated that the end of World War II and the closing of KOP had a much more negative impact on the area. The increased demand for workers at the MK&T was temporary. Both the railroads and agriculture in the county were on the decline and could not provide jobs for all those needing work. "Many who had moved into the area during the war years to work, primarily at the Plant, were having to relocate again because of a lack of available jobs in the Labette County area. The population soon reverted to the downward trend that had been evident before the war" (Macy et al. 1970:20).

The authors also noted that, although comparative data were limited, there were indications that manufacturing efforts had increased after the end of the war. "By 1947, the 34 manufacturing companies located in Labette County were employing 578 people. However, it was considerably below the 7,000 plus employment level during the KAAP's operation. Despite some growth in manufacturing, the economy of Labette County during the post-war period was clearly one based on trade and service for a declining market area" (Macy et al. 1970:20).

But the impact of the plant must not only be considered from an economic viewpoint. As noted above, the majority of the applicants for unemployment compensation at the close of operations were women. Some women were certainly there just to collect compensation, intending to return to the home rather than move on to future employment. Some men were there just to collect the compensation as well. But the majority may have agreed with Maxine Larsen, that "women weren't happy to stay at home" after having a taste of the independence and freedom that came with working (Larsen, interview 1995). Her mother's generation could have returned to the home, she added, but not hers.

There is disagreement among historians about the how employment opportunities for women during World War II affect concepts and attitudes regarding gender equality (Kane 1994:261). Interviews with local employees reflect some doubt about the impact this facility had in that area, even though as much as 75 percent of the employees were women. Josephine Habiger (interview 1995) felt that many of the women working at the plant would not have taken jobs had a ready opportunity to work not been offered. That they

could work was secondary; that they had a chance to earn extra money for their families was the primary consideration. Winifred Morrow (personal communication 1995) expressed almost exactly the same idea. Robert Oxford (interview 1995) also agreed, but later added that

a thing like that . . . puts unrest in people. They get used to working for what they thought was pretty good wages, and all of a sudden get off, they didn't like that. . . . They liked this money coming in. I think it caused more unrest among women than it did men. . . . The men, well see, they'd probably go to another job or something else anyway, you know. But the women had to go back home and start cooking again, and they didn't like that.

Maxine Larsen (interview 1995) expanded the topic to cover not only the changing attitudes of women, but of all people as new technology, greater material wealth, and the greater expectations that accompanied increased availability of material goods came to the area after the war.

The whole thing has evolved. Your wants, your needs have all increased. Now, before the war you didn't know any better, you didn't want any better, because nobody else had anything either. . . . You can't just stand still. . . . Would the women have just continued to stay on the farm and to just do their job and never go to work—who knows? If the plant hadn't come, . . . something else would have happened. . . . [This] would have been inevitable, even if we'd never had a war. Because I think people would have wanted more than they had when I was growing up.

On a state-wide level, KOP contributed to the World War II experience that helped bring about what historian K.S. Davis (1976:201) has called a psychological change in the average Kansas resident. The Eisenhower family had settled in Dickinson County, Kansas, in 1878. All six sons of David Eisenhower and Ida Elizabeth Stover (both of German Mennonite extraction) grew up in Abilene, Kansas, and made names for themselves statewide and nationwide in business, politics, and the military. Then Major General Dwight David Eisenhower was designated the commander of the European theater of operations forces in the summer of 1942—"a *Kansan* had become the supreme soldier of the greatest war in history! The subsequent crushing of Hitler was rendered, thereby, a peculiarly Kansan triumph" (emphasis in the original; Davis 1976:202).

Davis went on to say that Eisenhower possessed "a psychology of 'middleness' or 'togetherness' that worked *against* unequivocal either-or choices and *for* coalitions, amalgamations, homogenizations on the basis of perceived common denominators among diverse people and things and forces," all of which he called "twentieth-century Kansas qualities" not considered heroic prior to the war (Davis 1976:203). Identification with Eisenhower helped Kansans overcome a sense of inferiority and of being a backward state. "Ike himself encouraged this resurgence of state pride . . . and emphatically identified himself with Abilene," saying at a victory celebration in his home town that "the proudest thing I can claim is that I'm from Abilene" (Davis 1976:204).

Similar sentiments had been heard from Governor Payne H. Ratner when KOP was presented with its first Army-Navy "E" award. "'More than a triumph for the Kansas ordnance plant [sic], more than a proud moment in the annals of Kansas,' the governor asserted 'this ceremony symbolizes a determination which goes out from the Kansas prairies and across the seas to answer the challenge of Hitlerism and Japism.'" Ratner alluded to the metaphor of the industrial front line, where workers were in effect serving under Eisenhower, by adding that "'production victories here at the Kansas ordnance plant [sic] . . . are prerequisites to victories in battle. As we cheer that so great and gallant Kansan, General Eisenhower, and the men with him, we know that the second front in Africa was made possible only by careful planning and hard work in factories here at home and by people like you, and you'" (VOX KOP 1942h:2).

The Contribution to the War Effort

There is, however, another side to the rhetorical statements of the politician and the broad generalizations of the historian. From the many awards KOP received and the accolades heard for improvements in technology, efficient operation, and an admirable safety record, it is evident that KOP played not only an important but a vital role on the industrial production front, a role illuminated throughout this report. The importance of the contribution of the individual worker to that role is less evident in discussions with some of the people who served on that front. Perhaps this is Davis' "sense of state inferiority" revealing itself to still be with Kansans on the individual level. Although all persons interviewed in the course of this research felt the plant was important to the war effort, some qualified that importance either on a personal level or more broadly. Josephine Habiger (interview 1995), who worked first as a secretary then as a laboratory assistant, said "I really have never felt that I did an awful lot at the plant. . . . I just never thought that I was a long enough of an employee to be a key employee, because I did not get employed in production. I probably would have thought I was less if I'd have stayed in the office." Harold Cooper (interview 1995) had a stronger opinion. "I had the silly idea that I was going to help win the war by working out there." He had only worked at the plant a few months, probably in the 1400 Area (Inert Storage), when "it got so slow that I went in to the superintendent and told him that I was going to quit, that I was a detriment, I was drawing my money and I wasn't doing anything. . . . I hated to go there, to work, because [it was] just a bunch of people sitting around and anybody that could find a new story to tell, why, that was the entertainment. . . . I felt guilty to go to work."

THE ENVIRONMENTAL LEGACY

There were likely at least some positive impacts on the local environments of most GOCO facilities, one of which was the safe haven these could provide for plant and animal species threatened by increasing farming activities and settlement (Kane 1994:303). At KOP, though, normally tight restrictions were sometimes lifted and hunting under controlled conditions was allowed to reduce animal populations, especially of animals perceived as pests. A wolf drive was conducted by the KOP Guard Department in June 1945 because a large number of wolves had been seen in the plant area during the preceding year. Locals were allowed on the hunt, however "no firearms of any type are allowed, except by trained guards who will carry guns in case of emergency. Clubs will be the weapons carried by the other participants" (PS 1944d). Nothing relating the effectiveness of the drive was noticed in the historical reports or newspapers, but at least one wolf was sighted on the grounds the following January (PS 1945a).

Another area of potential environmental impact was the release of highly toxic chemicals used at the facility. A slight drought during the summer of 1943 brought water contamination to the attention of JMS management and local citizens. During the dry spell,

waste water from the plant made up a major portion of the flow of a few small streams leaving the area. At least one of these streams was a source of livestock water for some farms adjacent [to] the plant. The livestock refused to drink the TNT contaminated water and the plant was obligated to haul water for the livestock of this farmer for several days. This contamination came from Load Line I [the 900 Area] and at once work was started to [dig] a ditch to turn the waste in another creek while fire hydrants were opened adjacent the contaminated stream and the red water flushed out (KOP [1944]a:55-57).

JMS felt the problem could be solved by installing a series of evaporating ponds for each line. A proposal was submitted to the St. Louis FDAP, which did not grant approval. In the winter of 1943 and 1944, dead fish were noticed in Labette Creek. TNT contamination was suspected, but little was known about the toxicity levels for cold-blooded animals. Experimentation at the plant laboratory determined water levels containing over .5 parts per million TNT would not support fish for long. Although Labette Creek "carried

contamination to this extent at times, however, it was felt that the presence of a sewage disposal plant in the same vicinity was at least a contributing factor in the case of the dead fish" (KOP [1944]a:59-60).

THE POST-WAR YEARS

In September 1945, KOP was placed on stand-by, and it remained so until August 1950, a government-operated facility all the while (KOP [1967]:1). It was initially declared surplus and put up for sale by the War Reconstruction Finance Corporation, but was soon withdrawn from the list of surplus facilities and retained as a storage center and designated a "Class II Industrial Standby Installation under the command of the Chief of Ordnance and the Ordnance Ammunition Center (FDAP)" (KOP [1951]:1). While it was a government-owned government-operated (GOCO) facility, its primary mission from September 1945 through August 1950 was to receive, store, and issue ammunition, components, and explosives; preserve and maintain Joint Army-Navy Machine Tools (JANMAT) and Ordnance Corps Industrial Reserve (OCIR) machinery; store industrial reserve equipment; and to renovate ammunition (Day and Zimmermann 1992:1; KOP [1951]:8-9). The production equipment stored at KOP included machine tools and equipment from plants, arsenals, and depots that had been declared surplus by the Chief of Ordnance (KOP [1951]:8-9).

Land also continued to be leased to private individuals during this period. In 1945, 2,350 acres within the plant's boundaries were under lease, garnering \$3,420 per year. By 1949, the pre-Korean War peak, 11,300 acres were under lease for a total of \$11,600 per year. By 1951, the total had dropped to 6,600 acres, leased for \$12,200 per year (KOP [1951]:7-8).

KOP received three orders for preparing ammunition for long-term storage during this period. The first involved approximately 323,000 4.2-inch Chemical Mortar Shells and was carried out between June 1946 and November 1947. Twenty-seven persons worked on the project, performed in the 1100 Area. Between May 1948 and August 1949, 105-mm projectiles were prepared for long-term storage. The 1.75 million projectiles originally scheduled for processing were not completed due to a lack of funds. Lastly, Raritan Arsenal authorized KOP to "refuze and repack 19,740 complete rounds of 75mm ammunition and 85,457 complete rounds of howitzer ammunition." This work was undertaken between June 1951 and January 1952 (KOP [1951]:4-5).

As U.S. involvement in Korea increased, the plant was reactivated. It was partially reactivated in August 1950 under orders covering the loading of 105-mm shells in the 900 Area, and the production of fuzes and supplementary charges in the 300 and 500 areas, respectively (KOP [1951]:1), after these lines were renovated. Rehabilitation of the plant was carried out by the Corps of Engineers (HABS/HAER 1984:21), and by December the 900 Area was ready to go into production; the first shells were loaded in January 1951 (KOP [1951]:1). The National Gypsum Company took over operations from the government, once again making KOP a GOCO facility, under Contract Number DA-11-173-AMC-95(A) effective April 1951 (Day and Zimmermann 1992:1). The next month, renovation of the 500 Area was completed and production began; production began in the 300 Area in August (KOP [1951]:1). In 1953, the 1200 Area (originally the Ammonium Nitrate Plant) was adapted to rework cases for 105-mm ammunition returned from overseas (HABS/HAER 1984:25; KOP ca. 1985:3).

Production during the Korean War peaked in 1953 (*KAAPSULE* 1971:1), even though all production areas were not in operation until September 1954 (Day and Zimmermann 1992:1). During the Korean War, "artillery ammunition and bombs were loaded, component parts for artillery shells, fuzes, boosters, detonators, relays and primers were assembled, and 105mm cartridge cases were reworked" (Day and Zimmermann 1992:1). Ammunition and component production was completed 25 April 1956 (*KAAPSULE* 1971:1), but the plant continued to rework 105-mm ammunition until June 1957. After that month, the facility was placed in layaway and "idle facilities, not required for storage of Government material and stand-by activities, were made available for outleasing" (Day and Zimmermann 1992:1). This included some of

the magazines and warehouses, leased to private companies for storage (HABS/HAER 1984:26). From October through December 1959, the Bureau of Census, Department of Commerce, leased the entire Administration Area and a portion of the 1400 Area as a base of operations while conducting an agricultural census. At its peak, the Census Bureau employed about 1,000 persons (Day and Zimmermann 1992:2).

Little of note occurred at the plant in the early 1960s. The name of the facility was changed to Kansas Army Ammunition Plant on 1 July 1963, as per Department of the Army General Order No. 35 (Day and Zimmermann 1992:2; *KAAPSULE* 1971:1). All 20 staff residences constructed during the initial construction phase were disposed of by the Kansas City District of the Corps of Engineers in 1965 and 1966 (KOP [1967]:2).

KAAP was reactivated to produce munitions for the Vietnam conflict 20 December 1966 (KAAP [1985]:10), with all areas except the Cartridge Case Rework Area (1200 Area) to be brought back into production. Reactivation involved new construction and the conversion of some existing structures. "The demolition bomb line (1100 Area) was converted to a cluster bomb (CBU) line, the 105mm shell line (900 Area) was equipped for loading 81mm mortar rounds, and the 155mm shell line (1000 Area) was converted to a 105mm shell line" (Development and Readiness Command, Department of the Army [DARCOM] 1982:iii). Each building involved was to be "razed, extended or modified to accommodate its planned usage"; new buildings in the 300 and 1100 areas were "designed generally to be similar to existing buildings" (KOP [1967]:4). On 2 February 1967 the contract for this work was awarded to the Martin K. Eby Construction Company, Wichita, Kansas, to be supervised by the Kansas City District of the U.S. Army Corps of Engineers. Included in the contract was the construction of a new lead azide and sodium azide facilities, designed by the E.I. duPont de Nemours & Company, Inc., Wilmington, Delaware (DARCOM 1982:iii). Completed in 1968, these have only been used on a trial basis (Grillot, personal communication 1995; HABS/HAER 1984:25).

National Gypsum continued to operate KAAP until 1 March 1970, after which Day & Zimmermann, Inc., Philadelphia, Pennsylvania, assumed operations under Contract No. DAAA09-70-C-0245 (Day and Zimmermann 1992:2, 10). In 1972, efforts to modernize the 900 Area for automated production of the M374A3 mortar cartridge were begun. The modifications were finished in 1976 (HABS/HAER 1984:23). In 1975, work began on modernizing the 300 Area, after which the 155-mm Improved Conventional Munitions (ICM) round (M483A1) would be produced there. Production of that item of ordnance began in January 1977 (DARCOM 1982:iv; HABS/HAER 1984:22). In 1978, the 900 Area was placed in layaway (HABS/HAER 1984:23). Throughout the 1980s and into the early 1990s, Day & Zimmermann continued to produce 155-mm ICMs, CBUs, detonators, Combined Effects Munitions (CEM), Antiarmor Cluster Munitions (ACM) bombs, Extended Range Antiarmor Munitions (ERAM), and other items as directed (DARCOM 1982:iv; Day and Zimmermann 1992:2; HABS/HAER 1984:21-25). Currently, all but the 1100 Area is inactive and slated for disposal (Grillot, personal communication 1995).

SUMMARY AND CONCLUSIONS

The Kansas Army Ammunition Plant, originally the Kansas Ordnance Works (KOP), was one of 77 World War II government-owned contractor-operated industrial facilities supplying munitions and armaments to Allied troops on the Pacific and European fronts. Construction of the facility on 17,000 acres in southeastern Kansas' Labette County began in mid-1941, prior to the bombing of Pearl Harbor, and was completed in about one year despite inclement weather and numerous change orders. It was designed to load 105-mm shells, 155-mm shells, and bombs, and to produce fuzes, boosters, detonators, and primers, as well as to crystallize ammonium nitrate. In accordance with orders from the Quartermaster General and the Ordnance Department to conserve steel and save funds, most of the buildings were framed with wood. The walls of most nonproduction buildings were also wood, but those of buildings that housed the various stages of production were usually built of vitrified clay tile or concrete brick. KOP was designed by two architect-

engineer firms—Consoer, Townsend and Quinlan; and Battey & Childs, both of Chicago, Illinois—and built by Peter Kiewit Son's Company, George W. Condon & Company (both of Omaha, Nebraska), and Paschen Construction, Inc., (of Chicago, Illinois) under CPFF contracts W-ORD-518 and W-ORD-518 DA-W-ORD-5. The work was overseen by the agent operator, J-M Service Corporation (JMS), a subsidiary of Johns-Manville Corporation, New York.

Some problems with the completed facility were attributed to the standardized designs from which JMS and the architect-engineers had to work. Buildings were designed to accommodate equipment and equipment layouts that were often out of date, so that equipment procurement had to be made on the basis of what would fit in the buildings rather than what was most efficient. JMS personnel included fairly copious comments in the historical record regarding how industrial mobilization planning could be improved to eliminate the various problems they encountered.

Operations began in April 1942, when a few dozen 250-pound bombs were loaded in the 1100 Area. All production lines were in operation by the end of the summer of that year. Procedures were streamlined throughout initial operations, with accompanying reductions of personnel and lowering per-unit production costs. Schedules were reduced by the Ordnance Department in the first half of 1943, then in April 1943 the Ammonium Nitrate Plant was closed and in May the lines where fuzes and detonators were loaded were shut down. Schedules were increased during the second half of the year, and two lines were modified to load different types of ordnance. One of these lines, the 1100 Area, where 250- and 1,000-pound bombs had previously been loaded, was to load 4.2-inch chemical mortar shells with high explosives.

JMS made many improvements to manufacturing processes during its World War II operation of KOP. Many of these improvements involved further automating production. For example, primer production, initially a manual process, was nearly fully automated by the end of 1942, trebling production. Some of the developments at the facility impacted the entire industry. A method of drilling the explosive fill of shells vertically rather than horizontally increased safety and reduced employee exposure to toxic dust. But the core melt unit, which reduced the effort and time involved in filling shells with explosive as well as improving the quality of the fill, was the most important innovation at KOP. The units could process up to 83 shells at one time. In appreciation of its contributions to the war effort in terms of production and development, KOP was cited five times with Army-Navy "E" awards. The order to cease production at the facility was received 14 August 1945.

Locating the GOCO industrial facilities in rural areas like Labette County was a mixed blessing to the local residents. Over 300 individuals in 130 families were forced to leave the land on which KOP was built. Most of the displaced people seem to have accepted the situation without much ado, but several owners fought the government in the courts for higher valuation of their land. At least a few had considerable financial difficulties during relocation, made worse by the length of time it took for the government to pay them for their property.

In addition to land, the government acquired the crops and many of the structures of former residents in the plant area, many of which were sold or razed during construction and early operations. A few remained standing for some years and were used by JMS as a first aid station, a residence for renters, offices, a training school, and for the storage of hay. Two cemeteries, the Franklin and the Fairview, still remain at the facility.

Parsons was the city nearest the entrance of KOP, and the municipality most likely to reap the benefits or suffer the difficulties associated with the plant. The greatest boom period for Parsons occurred during construction, when the population increased from about 12,000 to perhaps as high as 19,000, although official counts show the peak to have been less than 15,000. Many operations employees commuted to and from work, spreading the impact of the facility not only across Labette County but also into the surrounding counties. Although there were reports of severe housing shortages in Parsons during operations, the low

occupancy rates at the plant dormitories and the Winway Addition, a government housing project, indicate these may have been exaggerated. Neither Parsons nor the wider area seems to have been put under any great strain during operations.

The shortage of labor in the area encouraged JMS to look for employees among nontraditional sources. Although few ethnic minorities seem to have been employed at KOP, women formed a large portion of the work force. As early as September 1942, 36 percent of the production line employees were female. Women were gradually offered a greater range of positions, and some were given supervisory responsibilities. Female employees, for their part, more actively participated in supervisor and manager training courses offered by JMS than did their male counterparts. However, at the end of the war, the women were the first to be released from service.

When KOP closed at the end of World War II, many of the ex-employees were either absorbed by local industry or, in the case of an unknown number of females laid off, returned to the home. Others moved from the area, and the population of Labette County resumed the downward trend that had been interrupted by the war. Over the longer term, the facility's greatest impact may have been the job opportunities presented to women in the region. Coming at a time when women were seeking greater independence, job opportunities, personal careers, the plant reinforced desires already extant.

And finally, one comment needs to be made regarding the historical record related to the construction and World War II-era operations of KOP. Although the historical documentation is fairly extensive, the way this documentation was written has resulted in several contradictions, little continuity of information over time, and a lack of items like total employment at the facility. Most of the plant histories were composed of individual department and production line historical reports. The events and statistics recorded by one department were seldom comparable to those recorded in the various other departments, so plant-wide generalizations were difficult to make. At several places in this report, cautious generalizations were made from information given for only one production area; the limits of the information have been mentioned in the text. Contradictions in the historical record have been resolved if possible, the contrasting statements both mentioned where necessary.

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